Harnessing Ancestral Roots to Grow a Sustainable World

van der Wal, A.J.

2018

Harnessing Ancestral Roots to Grow a Sustainable World

Arianne J. van der Wal

Reading committee:

prof.dr. A.E. van den Berg
dr. B. van den Bergh
prof.dr. W. van Dijk
dr. M.C. Leliveld
prof.dr.ir. H.C.M. van Trijp
prof.dr. M. Zeelenberg

Harnessing ancestral roots to grow a sustainable world
Arianne J. van der Wal
PhD thesis, Vrije Universiteit (VU) Amsterdam

This research was funded by the Faculty of Economics and Business Administration from the VU and consulting agency VODW

The cover photo was derived from Wikimedia Commons (Author: Diorit) and titled:
Illegal slash and burn practice in the region west of Manantenina

This book is number 32 in the ABRI (Amsterdam Business Research Institute) dissertation series
Printed by Haveka BV, The Netherlands
ISBN: 978 90 361 0535 4

VRIJE UNIVERSITEIT

Harnessing Ancestral Roots to Grow a Sustainable World

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. V. Subramaniam
in het openbaar te verdedigen
ten overstaan van de promotiecommissie
van de School of Business and Economics
op dinsdag 18 december 2018 om 9.45 uur
in de auditorium van de universiteit
De Boelelaan 1105

door

Arianne Janke van der Wal
geboren te Leiden

promotor:	prof.dr. R.T. Frambach
copromotoren:	dr. F. van Horen dr. A. Grinstein

To the growth of a sustainable world

Contents

Chapter 1	General introduction	11
Chapter 2	Green competition: Persuading self-interested people to behave sustainably	31
Chapter 3	The paradox of “green to be seen”: Green high-status shoppers excessively use (branded) shopping bags	63
Chapter 4	Temporal myopia in sustainable behavior under uncertainty	73
Chapter 5	Do natural landscapes reduce future discounting in humans?	105
Chapter 6	General discussion	121
	Footnotes	141
	References	145
	Summary	161
	ABRI dissertation series	167

Chapter 1

General introduction

The world is burning. Not figuratively, but literally (see cover photo). Evidence from air photography and remote sensing suggest that around 40% to 50% of Madagascar's forest present in 1950 was lost by 2000 (Harper, Steininger, Tucker, Juhn, & Hawkins, 2007). The same accounts for regions such as Sumatra and Indonesian Borneo that lost about 40% of lowland forest in just 15 years (1990-2005; Hansen, Stehman, Potapov, Arunarwati, Stolle, & Pittman, 2009). Primary causes of deforestation include slash-and-burn for agricultural or pastoral land. For example, oil palm directly caused 27% of total deforestation in Indonesia between 2007 and 2008 (Carlson et al., 2012). Unfortunately, deforestation most often result in desertification, water resource degradation, soil erosion, and biodiversity loss (Allnutt et al., 2008). Moreover, deforestation generates 10–20% of net global greenhouse gas emissions (Van der Werf et al., 2009).

Not only do we deforest the world, we deplete the natural resources of the earth in many other ways. For instance, 62 metals are needed for our technological needs such as smartphones, fossil fuels are burned for our increase air transportation needs, and huge amounts of water, energy and industrial chemicals are used for our intensive farming (Graedel, Harper, Nassar, & Reck, 2015; Kulak, Graves, & Chatterton, 2013; Scholl, Schipper, & Kiang, 1996). All the above examples contribute to the current climate change resulting in extreme temperatures, a rising of the sea level, and the extinction of ecological plants and animals among others (Bhuiyan, Jabeen, Zaman, Khan, Ahmad, & Hishan, 2018). Moreover, in the current way that the earth is exploited, future generations face even a harder challenge for their survival (Capellán-Pérez, Mediavilla, de Castro, Carpintero, & Miguel, 2014). The availability of fossil fuels and minerals are not infinite and depletion is irreversible, which means that humans cannot renew these limited resources.

The international governments are getting more and more aware of the fact that something has to be done about this extreme exploitation of the earth's resources and climate change (Biesbroek et al., 2010). In particular, to ensure future prospects for upcoming generations, as they will, among others, be threatened by extreme droughts, food shortages, and floods (Bohle, Downing, & Watts, 1994; Gregory, Ingram, & Brklacich, 2005; McGranahan, Balk, & Anderson, 2007). Over the past ten years

governments in Western Europe have developed integrated strategies on the topic of sustainable development, like land management and the mitigation of climate change (Casado-Asensio & Steurer, 2014). Moreover, the United Nations agreed to strengthen the global response to the threat of climate change and to not exceed the limit of a global temperature rise of 2 degrees Celsius this century (Rogelj et al., 2016).

With the growing concerns among governments regarding the environment, persuading consumers to act in a sustainable manner is a key goal within their policies (Penn, 2003). However, changing people's behavior in the sustainability context is very difficult (Dietz, Ostrom, & Stern, 2003; Morren & Grinstein, 2016). Even though the awareness about sustainability problems rises among consumers, they are still reluctant to act sustainably. According to Luchs, Naylor, Irwin, and Raghunathan (2010) 40% of consumers have sustainable attitudes; unfortunately, only 4% of these consumers actually behave sustainably. To provide a specific example: people generally have negative attitudes towards food waste, but still admit that their household is contributing in the wasting of food (Stancu, Haugaard, & Lätheenmäki, 2016). In other words, people do not act in accordance with their negative attitude towards food waste (e.g., buying less food or making a meal of left-overs), even though they seem to be aware of the fact that they are buying too much food without consuming it.

This strong difference between people's attitudes and sustainable behavior is referred to as the sustainability related intention-behavior gap (Csutora, 2012; Kennedy, Beckley, McFarlane, & Nadeau, 2009; Kollmuss & Agyeman, 2002). This intention-behavior gap can be discussed and potentially explained by different perspectives, encompassing personality, learning, culture, and social perspectives (Whitmarsh, Seyfang, & O'Neill, 2011). Some scholars suggest that people do not act according to their pro-environmental attitudes, as they feel that their actions are insignificant or that it is not their responsibility (i.e., personality factors; Blake, 1999) and that a lot of people do not actually know the causes of the sustainability problems or how to behave to help reducing humans' impact on the environment (i.e., learning factors; Hines, Hungerford, & Tomera, 1987). Other scholars suggest that consumers are locked into unsustainable lifestyles due to cultural and social contexts even though they are not necessarily willing and happy to act this way (Jackson, 2005; Sanne, 2002).

Examples include the consumer culture where people are persuaded to buy products to not only satisfy material needs but also needs of social stratification and cultural identification, or the promotion of individual means of transport, in particular cars, of which many households now have more than one, or the emerging communication infrastructure, which forces people to constantly buy new technological devices.

Additionally, there are many practical and institutional factors hindering people to act sustainably. Blake (1999) argues that people could have a lack of time to recycle or do not have enough money to buy the more expensive sustainable products (practical factors), or that no incentives or information is provided to nudge people's sustainable actions (institutional factors). Moreover, Thøgersen (2005) touches upon the infrastructure, as in the availability of sustainable products and services, as another alternative to explain the intention-behavior gap.

The current dissertation tries to explain the sustainable intention-behavior gap and provide solutions to narrow this gap from an understudied perspective: an evolutionary perspective. Evolutionary theory explains that people have certain behavioral tendencies that evolved during Pleistocene era when humans lived as hunter-gatherers, as they increased people's survival rates (Barrett, Dunbar, & Lycett, 2002; Buss, 1999). These ancestral behavioral tendencies still have strong impact on people's behavior, represented in our daily actions, but people are mostly unaware of these tendencies (Barrett & Kurzban, 2006; Kenrick, Griskevicius, Neuberg, & Schaller, 2010). Multiple of these innate behavioral tendencies are, however, non-sustainable (e.g., valuing the present and self-interest over the future and collective interest; Griskevicius, Cantú, & Van Vugt, 2012; Penn, 2003). Hence, even though people have positive attitudes towards the environment, they might not act sustainably as they are hindered by these non-sustainable innate/instinctive motivations. Furthermore, the intention-behavior gap might also be the result of sustainable policies and marketing strategies that mismatch these tendencies. Overall, this dissertation investigates whether sustainable strategies that match people's innate behavioral tendencies does help to increase actual sustainable behavior and not merely sustainable attitudes.

Explaining the intention–behavior gap from an evolutionary perspective

In order to understand why people behave the way they do, one must first go back to how the human race has evolved: by natural selection. Natural selection is based on three premises and their logical consequence (Barrett et al., 2002). All individuals of a particular species show variation in their behavior (premise 1: principle of variation), a part of this variation between individuals is heritable (premise 2: principle of heritance), and there is competition among individuals for survival, with higher survival rates for those who adapt better than others (premise 3: principle of adaptation). As a consequence, those who adapt better, will also more successfully propagate their genes in future generations (survival fitness: principle of evolution).

Furthermore, an evolutionary perspective helps to explain human behavior by understanding why a particular behavior enables survival and production of offspring (known as the ultimate explanation; Barrett et al., 2002). Ultimate explanations are therefore concerned with the fitness consequences of a particular behavior and focus on why a given behavior would have evolved (evolutionary function). In contrast, proximate explanations are concerned with the mechanisms that steer a particular behavior and focus on relatively immediate triggers for behavior, such as personality, learning, culture, incentives, preferences, utility, pleasure, happiness, values, and emotions (Griskevicius et al., 2012; Kenrick et al., 2010; Saad, 2013; Scott-Phillips, Dickins, & West, 2011). Evolutionary researchers – as opposed to social scientists and consumer researchers – acknowledge the importance of considering the ultimate, evolutionary reasons for behavior to provide a more in-depth explanation, as it derives from the adaptive function of behavior.

Notably, an evolutionary perspective stresses that all behaviors can be explained by both ultimate and proximate motivations (Griskevicius et al., 2012; Scott-Phillips et al., 2011). For example, people generally like chocolate because it elicits pleasure (proximate motivation) and because humans have evolved to crave sweet and fatty foods (ultimate motivation). An important distinction between these two motivations is that people are especially not effective at recognizing the ultimate motivations for their actions, because they are mostly unaware of these underlying motivations (Barrett

& Kurzban, 2006; Kenrick et al., 2010). This lack of awareness of these innate/instinctive motivations might help explain the intention-behavior gap from an evolutionary perspective. For instance, consciously people might want to act sustainably as they have strong universalism values (Schwartz, 1992) or feel guilty about their own non-sustainable actions (proximate motivations), but are unaware of their ultimate motivation to prioritize individual interest over collective interest, hindering them from acting sustainably.

Evolutionary perspective on sustainable behavior

In order to successfully adapt to the environment, our ancestors – who were nomadic hunter-gatherers living in groups of 50-150 people on a planet with a population of fewer than one million – developed many ultimate motivations, such as self-protection, affiliation, status, mate acquisition, mate retention, and parenting (Kenrick et al., 2010). In realm of sustainability, Griskevicius and colleagues (2012) define five ultimate motivations, which are at present – in a world where most people permanently live in dense urban areas on a planet populated by billions – maladaptive as they drive people to act non-sustainably and exacerbate the sustainability problems.

The first ultimate motivation that makes people acting non-sustainably is the propensity to *prioritize individual interest over collective interest*. Natural selection made people care for the replication of their own genes, even though this could affect the survival of others' genes negatively (Buss, 1999). This conflict between individual and collective interest have caused many sustainability problems. One famous phenomenon, that captures this conflict, is the tragedy of the commons (Hardin, 1968). A well-documented real life example of the tragedy of the commons is the overfishing of 13 commercially important fish species in the northwest Atlantic to the point of decline or even extinction by the early 1980s due to the intense competition of fishermen over the fish (Gardner & Stern, 2002). Each fisherman tried fishing as much as possible fish out of the sea to make a good profit, believing that the costs could be shared collectively as the resource of fish was huge in size and their individual impact so little. However, all fisherman did the same, which made their impact on the resource

of fish so big that the resource got depleted. Another example is the currently escalating poaching of rhinos (Biggs, Courchamp, Martin, & Possingham, 2013).

This phenomenon is also well reflected in experimental resource dilemma research, which shows that people often overharvest, especially, and most related to the current sustainability problems, when there is uncertainty about the resource size or how other people behave (Gustafsson, Biel, & Gärling, 1999; Van Dijk, Wilke, Wilke, & Metman, 1999; De Kwaadsteniet, Van Dijk, Wit, & De Cremer, 2006). Consumers are often not aware of the amount of resources that are (still) available for their current life-style patterns. And even though they know that consumption takes up resources and causes sustainability problems, people are hardly willing to consume less (Grinstein & Nisan, 2009). Importantly, strategies to promote sustainable behavior by urging people to value the collective interest over their own individual interest is ineffective, as it does not match the self-interested tendencies that humans developed by evolution (Penn, 2003). For example, persuasion strategies that stress the importance of deconsumption purely for the sake of sustainability problems is rarely effective (Gardner & Stern, 2002).

The second ultimate motivation that hinders people from acting sustainably is the *desire for relative rather than absolute status*. This motivation can be explained by the handicap principle from Zahavi (1975), which posits that natural selection favors behavior that incurs costs to the individual, such as resources, energy, risk or time, when it simultaneously signals its fitness. The famous example is the peacock's tail. The big tail makes the peacock more prone to predators (costs), but managing to survive with such a big tail shows his fitness, which attracts the peahens. In humans, the desirability of relative status has resulted in excessive consumption that has no immediate survival value; also referred to as conspicuous consumption. This form of consumption occurred throughout human history, from Egyptian pharaohs displaying their wealth with giant pyramids to Indian maharajahs keeping collections of exotic animals (Sundie, Kenrick, Griskevicius, Tybur, Vohs, & Beal, 2010). Such a public display of resources, is a means of either attaining or maintaining a given social status, which enhances reproductive opportunities, as it can be seen as a signal of good genes for potential mates (Saad, 2007; Zahavi, 1975).

Conspicuous consumption to advertise wealth occurs worldwide at less extraordinary levels in buying luxury products/brands (Bagwell & Bernheim, 1996). The fact that people strive for relative rather than absolute status imprisons humanity in a vicious circle (Veblen, 1899). For instance, people instinctively want to acquire products that high status individuals have, such as expensive designer clothes, costly and polluting cars, and homes in expensive neighborhoods. However, if general people are able to acquire these luxury items (or even cheap copies of them) then the high status individuals acquire more costly and ostentatious items to display their wealth. Consequently, this has contributed to the depletion of natural resources, pollution, and waste (Penn, 2003). Importantly, strategies to promote sustainable behavior by urging people to be content with their current level of status or even asking them to lower their status by decreasing their consumption, does not match the ultimate motivation to desire relative status (Griskevicius et al., 2012).

The third ultimate motivation that negatively affects people's sustainable behavior is the predisposition to *value the present over the future*. Natural selection shaped people in this way, as survival rates would have decreased if our ancestors did work to satisfy future needs rather than immediate needs (Wilson & Daly, 2004). In addition, during ancestral times humans' work (e.g., gathering and hunting for food) often resulted in direct rewards. Even though people in modern societies do not need to find food daily to survive, they still weigh immediate benefits more heavily than future benefits (Fredrick, Loewenstein, & O'Donoghue, 2001; Green & Myerson, 2004). People strongly discount delayed gratifications – the subjective value of 100 euro decreases when given with a delay of three months – and opt for smaller immediate rewards over bigger future rewards and (Griskevicius, Tybur, Delton, & Robertson, 2011).

This heightened preference for the here-and-now as opposed to the future is one of the important causes for the current sustainability problems (Griskevicius et al., 2012; Penn, 2003), as sustainable behavior is inherently associated with a future orientation (Luchs et al., 2010; Phipps et al., 2013). Attempts to foster sustainable behavior that mismatches this predisposition of valuing the present over the future are proven to be ineffective. For instance, Gardner and Stern (2002) showed that

sustainable strategies that highlight the consequences of wasteful behavior on future generations do not spur people to act sustainably. Furthermore, research has shown that people generally experience psychological distance towards the sustainability problems. Psychological distance – with temporal distance being a key aspect (Liberman & Trope, 2008) – is associated with the future and in turn decreases people's concerns about the environment (Spence, Poortinga, & Pidgeon, 2012). Abstract messages, as opposed to concrete messages, increases the psychological distance and are therefore found to be an ineffective strategy to promote sustainable behavior as well (Van Dam & Van Trijp, 2011).

The fourth ultimate motivation that obstruct people to act sustainably is the proneness to *disregard impalpable concerns*. Through natural selection our brains evolved to understand only the direct world around us, that part of the world that affected our capacity to survive and reproduce most in both place and time (Ornstein & Ehrlich, 2000). Hence, the human mind does not comprehend the many sustainability problems that involves the entire world, significant human population and all other living species on it. Furthermore, it does not perceive the consequences of human action on sustainability problems readily, as it takes place over years and decades. In other words, there is a mismatch between humans' evolutionary mechanisms that are predisposed to respond to small scale and immediate situations (e.g., bears, burglars, and downpours) and the large scale and slow moving sustainability problems (Penn, 2003).

Moreover, hunter-gatherers experienced a strong tangible and visceral link between their actions and the consequences for the environment (Griskevicius et al., 2012). If group members exploited the natural resources in the area they became hungry. In the modern world people rarely see, hear, smell, touch, or feel how their behaviors affect the environment. If people buy all the food from the store, more food will again be available tomorrow. Or when purchasing meat, people do not see the suffering of the animals or the pollution of ground water by nitrate. Since the tangible and visceral link between their behavior and the environment are disconnected, people do not act sustainably. Strategies to promote sustainable behavior showing the consequences of the sustainability problems for distant locations or the world in

general and those that present it in a statistical rather than a tangible and visceral manner, do not match people's ultimate motivation to disregard impalpable concerns (Griskevicius et al., 2012). For example, Scannell and Gifford (2013) showed that messages highlighting climate change's global impact did not spur people's sustainable behavior.

The fifth ultimate motivation that influences people's sustainable behavior is the proclivity to *unconsciously copy others*. According to natural selection it is important for survival fitness to be highly adaptive. In ancestral environments, people who copied and imitated others behavior, saved the costs of individual trial-and-error learning substantially (Griskevicius, Goldstein, Mortensen, Cialdini, & Kenrick, 2006; Simon, 1990). Hence, following other people's behavior has an adaptive advantage (Cialdini & Goldstein, 2004; Kameda, Takezawa, & Hastie, 2003). Indeed, Chartrand and Van Baaren (2009) showed that cognitive brain structures which enable mimicry are innate and can be automatically triggered.

What other people are doing is driving people's behavior, also in the realm of sustainability. Researchers have shown that sustainable behavior is strongest influenced by how the neighbors behave, more so than financial incentives or personal sustainable attitudes (Nolan, Schultz, Cialidini, Goldstein, & Griskevicius, 2008; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Strategies that mismatch the ultimate motivation to copy others are those that tells people that they should behave sustainably (i.e., bringing a reusable coffee mug when buying a coffee) even though it is known that the norm is to not behave in that manner. Furthermore, messages such as "People waste 150,000 tons of food each day" try to make people reduce their food waste, but unconsciously contains the message that food waste is the norm and will therefore not reduce food waste.

Fortunately, research has shown that strategies that match this ultimate motivation can also be successfully used to promote sustainable behavior. Goldstein, Cialdini, and Griskevicius (2008) have shown that normative messages, such as "almost 75% of the guests help the environment by reusing their towels" did increase people's sustainable actions (i.e., re-using their towels) in comparison to messages that merely stressed the importance for the environment. Especially, descriptive norms (what most

others do) rather than injunctive norms (what most others approve/disapprove) are found to be influential (Cialdini, Reno, & Kallgren, 1990).

The present dissertation

Recent research in marketing and consumer behavior calls for integrating an evolutionary perspective into research on consumer behavior, as it acknowledges the importance of considering people's ultimate motivations as well as the proximate motivations to explain consumers' behavior (Hantula, 2003; Pham, 2013). More importantly, using an evolutionary perspective might help explain and provide solutions to narrow the sustainable intention-behavior gap. Namely, people are mostly unaware of their ultimate motivations, which could hold them back in acting sustainably even though they are consciously (by proximate motivations) willing to do so. Moreover, Griskevicius and colleagues (2012) argue that sustainable strategies should harness these evolved human ultimate motivations to enhance people's sustainable behavior. In particular, this dissertation investigates the effectiveness of matching the sustainable strategies to four premises derived from evolutionary theory related to previously described ultimate motivations: (1) humans are self-interested by nature, (2) humans are driven by relative status motives, (3) humans are temporal myopic, and (4) humans are biophilic (see Table 1 for a Chapter overview, which will be explained in more detail below).

Chapter 2 builds on the premise that people are by nature self-interested and care for the replication of their own genes (Buss, 1999; Griskevicius et al., 2012). Due to this motive people strive to be successful in mating. This results in rivalry via intrasexual selection, in which members of the same sex compete against each other to be the best on certain traits that increase competitive ability (e.g., large body size and aggression among males), and via intersexual selection, in which members of the same sex compete against each other to be the best on certain traits that are appreciated by the other sex (e.g., a young and beautiful appearance amongst females; Barrett et al., 2002). Competition is therefore a strong innate behavioral tendency, that

Table 1. Chapter overview

	Evolutionary based premise	Key theoretical principles	Matching strategy	Outcomes
Chapter 2 - Two lab experiments - One online experiment - One experimental field study	Humans are self-interested	Intrasexual selection	Create a sustainability competition	Competing to be most sustainable increases people's sustainable behavior Even among pro-selves, who are normally not inclined to act sustainably
Chapter 3 - One observational field study	Humans are driven by relative status motives	Competitive altruism theory	Provide signaling options so people can display their sustainable behavior publicly Caution: make the signaling options environmental friendly	Status motives make people act sustainably if they can display the behavior publicly Paradox: people buy more plastic branded shopping bags to display their sustainable groceries, which is in itself a non-sustainable and wasteful act
Chapter 4 - Two lab experiments - One online experiment - One experimental field study	Humans are temporal myopic	Life history theory	Emphasize the immediate benefits of sustainable behavior during uncertain times	Uncertainty decreases people's sustainable behavior as people become more temporal myopic Emphasizing the immediate benefits of sustainable behavior during uncertain times buffers this negative effect
Chapter 5 - Two lab experiments - One experimental field study	Humans are biophilic	Biophilia	Expose people to nature	Exposure to natural as opposed to urban environments makes people value the future more Nature exposure decreases temporal discounting

is omnipresent and occurs mainly unconsciously, emotive and instinctive, rather than consciously and based on purposeful reasoning (Klintman, 2013).

Even though the link between competition and sustainability can be viewed as counterintuitive as competition is often associated with causing many sustainability problems (Bennett, Pierce, Snyder, & Toffel, 2013; Biggs et al., 2013), Chapter 2 proposes that competition can be used as a driving force to promote people's sustainable behavior. In particular, as it offers self-interest benefits, such as prizes/awards (Connelly, Tihanyi, Crook, & Gangloff, 2014; Terwiesch & Xu, 2008) and can enhance positive self-image (Lim, 2010). The direct effect of competition on sustainable behavior but also the moderating role of social value orientation were investigated. Social value orientation is a well-established personality trait that distinguishes between pro-selves, who are concerned with maximizing their own outcomes, and pro-socials, who are concerned with maximizing outcomes for the common good (Messick & McClintock, 1968; Van Lange, 1999). In doing so, both the ultimate motivation to compete as well as the proximate motivation of social value orientation were integrated in studying the effectiveness of competition to foster sustainable behavior. Moreover, the competitive process might especially be relevant for pro-selves. This is particularly of great interest, as it is important to find strategies that promotes sustainable behavior among pro-selves who are normally not inclined to act sustainably (Joireman, Lasane, Bennett, Richards, & Solaimani, 2001; Van Lange, Bekkers, Schuyt, & Van Vugt, 2007; Van Vugt, Meertens, & Van Lange, 1995).

In two lab experiments, one online experiment, one experimental field study shows that competition can indeed enhance actual sustainable behavior, such as recycling and donating to a sustainable non-governmental organization. Furthermore, three studies show that pro-selves are driving this effect, as they act more sustainably due to the competitive process itself (e.g., the prospect of winning a contest), whereas pro-socials act sustainably independent of the competition, as they are primarily motivated by the outcome of the competitive process (e.g., sustainability). Importantly, a competition-based sustainable strategy matching the innate tendency to compete enhances sustainable behavior by appealing to a broad public: both pro-socials *and* pro-selves.

Chapter 3 builds on the premise that people act sustainably due to the status benefits of such behavior as explained by the competitive altruism theory (Hardy & Van Vugt, 2006; Roberts, 1998). The competitive altruism theory argues that, when four conditions are met – (1) behavior displayed must be costly to the self, (2) group members must differ in the degree and manner of their altruistic behavior, (3) others must observe the altruistic behavior, (4) long-run advantages must be in place for the altruist – people benefit from being most altruistic. Despite the fact that altruism is costly to the self (i.e., costly signal), it is advantageous due to its attractiveness for potential mates and social status benefits (Barrett et al., 2002; Zahavi, 1975). By spending excessive amounts of energy, time, and money on activities that are essentially unselfish and good for others, altruists advertise some desirable underlying quality that is costly to obtain, such as resource control, vigor, or health (Smith & Bird, 2000). As such, individuals attempt to outcompete each other in terms of generosity by being the most altruistic group member. For example, Iredale, Van Vugt, and Dunbar (2008) found that men donate more to charity particularly when observed by women, demonstrating that men use altruism for intersexual competition. Moreover, the most altruistic member of a group is more desirable as romantic partner, colleague or leader (Engelhard, Van der Wal, & Van Vugt, 2013; Hardy & Van Vugt, 2006; Miller, 2007).

Sustainable behavior can be perceived as a form of altruism, since it is costly to the individual consumer (e.g., heightened expenses, changing one's habits, and de-consumption) and beneficial to the collective (e.g., reducing climate change, diminishing pollution, and saving natural habitats). Hence, when people can publically display their sustainable behavior and signal that they are relatively more sustainable than others, it can enhance status benefits. Previous research has shown that the ultimate motivation to desire relative status indeed fosters sustainable behavior when people are in a public setting (e.g., in a store; Griskevicius, Tybur, & Van den Bergh, 2010). In other words, sustainable behavior can be seen as a costly signal, by which people can show their willingness and ability to incur costs for others' benefit, but at the same time increase their own reputation (Barret et al., 2002; Zahavi, 1975).

In an observational field study the findings of Griskevicius and colleagues (2010) were replicated and extended by showing that status motives can lead to the public

display of sustainable behavior but can entail environmental costs. In two sustainable grocery chains, a high-status chain and a lower-status chain, customers of the high-status chain as opposed to the lower-status chain are more likely to purposely demonstrate their sustainable shopping behavior by using the shopping bags displaying the name of the chain (branded bags). Importantly however, shoppers of the high-status sustainable grocery chain bought ten times more branded shopping bags, which is in itself a non-sustainable and wasteful act, with obvious negative environmental consequences, such as enhancing pollution, carbon emission, and waste.

Chapter 4 builds on the premise that people are more prone to focus on immediate outcomes instead of future outcomes during uncertain times (Griskevicius, Delton, Robertson, & Tybur, 2011). This premise derives from the life history theory, which explains that resources like time, effort, and energy are limited and should be used efficiently in order to survive (Kaplan & Gangestad, 2005). Therefore, a trade-off between the resources must be made and a life strategy needs to be chosen. The life history strategy people adopt varies on a continuum from a strategy focused on future outcomes (slower life strategy) to a strategy focused on present outcomes (fast life strategy). The decision to prefer one strategy over the other mainly depends on the harshness and predictability of the environment in which people live and the certainty they have regarding their future (Barrett et al., 2002; Buss, 1999; Nettle, 2010). According to life history theory it is adaptive to adopt faster life strategies when the environment is uncertain, in order to ensure some immediate payoffs (i.e., immediate survival chances), as it is unknown what future holds. On the other hand, the adoption of slower life strategies to ensure future payoffs (i.e., future survival chances) is adaptive in a certain environment (Chisholm et al., 1993; Ellis, Figueredo, Brumbach, & Schlomer, 2009).

In line with the life history theory, arguing that humans' innate behavioral response is to aim for immediate outcomes and to discount the future while coping with uncertainty, previous research found evidence that environmental uncertainty indeed leads to the adoption of faster life strategies among people. Nettle (2010) and Wilson and Daly (1997) have shown that in neighborhoods with low life expectancy

women give birth on an earlier age compared to women living in more intermediate neighborhoods. Unpredictable family situations even lead to earlier menarche (i.e., fertility) in girls (Ellis & Garber, 2000; Moffitt, Caspi, Belsky, & Silva, 1992). Furthermore, people become more risk taking when reading an uncertain newspaper scenario as compared to a control scenario, as they try to obtain a bigger but riskier immediate pay off over a smaller immediate pay off they can get for sure (Griskevicius, Tybur, et al., 2011). Additionally, people prefer smaller immediate rewards over bigger future rewards when things are unpredictable and instable (Griskevicius et al., 2013).

Importantly, consumers in today's world are particularly facing both increasing levels of uncertainty (due to, for example, economic instability and terror attacks) as well as alarming consequences of unsustainable behavior. Although these two problems are central to consumers' lives, occur on a global scale, and have significant impact on the world's political, economic, environmental, and social landscapes, they have not been systematically studied in tandem before. One lab and one online experiment show that uncertainty decreases people's sustainable behavior due to the fact that they become temporal myopic (i.e., people become more prone to opt for immediate benefits as opposed to future benefits). Moreover, one lab study and one experimental field study show that matching the strategy for the promotion of sustainable behavior to the ultimate motivation to value the present over the future, could be used as a strategy to reverse the negative effect of uncertainty on sustainable behavior. A field study demonstrates this. Specifically, two weeks after the terror attacks on Brussels' international airport and subway system on March 22, 2016 – utilizing the high levels of uncertainty in the days following the tragic event – people at the central train station in Brussels donated more money to a sustainable non-governmental organization when the immediate benefits as opposed to the future benefits of the donation were emphasized.

Chapter 5 builds on the premise that people are biophilic by nature and therefore emotionally affiliate to other living organisms (Wilson, 2007). This premise derives from the fact that our ancestors where highly dependent on nature – resulting in a genetically based need to be near natural environmental stimuli – which may have endowed people with an affective and cognitive appreciation for the natural world

(Kellert & Wilson, 1993). Indications of biophilia can be seen throughout human history, as the extensive gardens of ancient Egyptian nobility, Persian settlements, and medieval Chinese villages show that people went to considerable lengths to maintain contact with nature (Ulrich, 1993). Even though, or maybe because, people in modern societies live mostly in built environments, they still crowd national parks or travel long distances to experience natural landscapes (Kaplan, 1987). Moreover, the biophilia hypothesis argues that nature grants people with important emotional and physical benefits (Gardner & Stern, 2002).

In line with the biophilia hypothesis, various environmental and social scientists have shown that nature exposure increases people's physical health, as in lowering blood pressure and speeding up recovery from hospital patients (Hartig, Evans, Jamner, Davis, & Gärling, 2003; Park & Mattson, 2008; Ulrich, 1984), as well as psychological health, as in reducing stress, enhancing positive emotions, and lowering depression and anxiety (Berman et al., 2012; Lederbogen et al., 2011; Maas, Verheij, Groenewegen, De Vries, & Spreeuwenberg, 2006; McMahan & Estes, 2015; Nisbet & Zelenski, 2011). Furthermore, nature exposure increases attentional capacity (Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009) and has a restorative effect after a stressful or depleting event (Kaplan, 1995; Van den Berg, Koole, & Van der Wulp, 2003). Importantly, it fosters generosity and pro-social behavior (Guéguen & Stefan, 2014; Joye & Bolderdijk, 2015; Weinstein, Przybylski, & Ryan, 2009).

In the context of sustainability, Griskevicius and colleagues (2012) argue that harnessing our ultimate motivation to love and cherish nature might promote more sustainable behavior. Two lab experiments, in which people were exposed to pictures of natural landscapes (unleashing human biophilia) or urban environments or no pictures at all, show that nature lowers people's temporal discounting. In other words, nature makes people more prone to opt for larger future benefits over smaller immediate benefits. Furthermore, it shows that this is not due to an increased self-control (related to Kaplan's attention restoration theory; 1995), but a heightened valuation of the future. An experimental field study, with the Amsterdam forest as natural environment and the Amsterdam Zuidas as urban environment, replicated these findings in a real life setting and thereby provide external validity. One can argue

that these findings provide evidence (at least indirect) for the positive effect of nature on sustainable behavior, since the findings of Chapter 4 show that temporal discounting decreases people's sustainable behavior.

Chapter 2

Green competition: Persuading self-interested people to behave sustainably

Abstract

Today's world is confronted with alarming environmental problems. Hence, it is of great importance to enhance consumers' sustainable behavior. However, sustainable marketers and policy makers often preach to the choir, missing out those consumers who are generally less motivated to act sustainably: pro-selves. Contributing to research in consumer persuasion and pro-social marketing, the current work investigates whether competition is a marketing strategy that could foster sustainable behavior also among pro-selves. This notion is counterintuitive as competitiveness is often associated with non-sustainable behavior. Across four studies in the lab, online, and field we demonstrate that competition is a successful marketing strategy to promote sustainable behavior. Moreover, we show that the natural tendency of pro-socials to behave sustainably is not (negatively) affected by competition, while competition is key in motivating pro-selves.

This chapter is based on an earlier version (with me as first author) of Van Horen, F., Van der Wal, A. J., & Grinstein, A. (2018). Green, greener, greenest: Can competition increase sustainable behavior? *Journal of Environmental Psychology, 59*, 16-28. https://doi.org/10.1016/j.jenvp.2018.08.007

Introduction

Concerns regarding the environment are increasing rapidly, as nature and resources are threatened by degradation, pollution, and climate change due to the growing world population, consumption, and globalization (Gardner & Stern, 2002). It is critical to enhance consumers' sustainable behavior to maintain enough resources and a healthy environment for future generations (Spence et al., 2012). Persuading consumers to act in a sustainable manner is an urgent need and a key goal for many governments, organizations, consumers, and society at large (Penn, 2003). Yet, behavioral change among people in the context of sustainability has proven to be very difficult (Dietz et al., 2003). Persuasion efforts thus far have yielded an upsurge in the adoption of environmental values and attitudes, but were not able to significantly increase sustainable behavior (Csutora, 2012). For example, despite widespread pro-environmental attitudes among consumers (40%), only a handful of consumers (4%) actually behave sustainably (Luchs et al., 2010).

The current research investigates whether using competition as a marketing strategy among consumers could work successfully in the promotion of sustainable behavior. We define competition as a contest between two or more individuals to obtain the most benefits (e.g., resources, goods, mates, prestige, recognition, awards, wealth, or power; Buss, 1999; Connelly et al., 2014; Lim, 2010; Terwiesch & Xu, 2008). Applying competition to increase sustainability is however counterintuitive, as competing is often associated with non-sustainable behavior. In fact, many environmental problems stem from competition for resources. Individual users in a competitive environment act upon their own self-interest, ignore the interest of the common good, and deplete available resources (Bennett et al., 2013; Biggs et al., 2013). Such reality is often referred to as the tragedy of the commons (Hardin, 1968).

We propose, however, that competition could be a powerful marketing strategy to promote sustainable behavior as it is particularly effective for people who are naturally less interested in supporting the common cause (pro-selves). Thus far, marketing strategies that are aimed at advancing the sustainability cause typically focus on the social aspects of sustainability (Griskevicius et al., 2012). For instance,

they emphasize the consequences of non-sustainable behavior for future generations (Gardner & Stern, 2002) or urge to value the group (i.e., collective outcomes) above themselves (i.e., individual outcomes; Penn, 2003). These strategies are expected to be more effective among pro-socials who are already motivated to act sustainably. Hence, such efforts preach to the choir and often miss out pro-selves who are generally not motivated to act sustainably. Competition provides the opportunity to obtain benefits for the individual such as prizes/awards (Connelly et al., 2014; Terwiesch & Xu, 2008) and can enhance positive self-image (Lim, 2010) – outcomes that are especially relevant for pro-selves. Although pro-socials are intrinsically less motivated to compete, competition does not hurt their motivation either, as competition within a sustainable domain fosters outcomes for the common good. In other words, we predict that competition will overall appeal to a broader public.

To the best of our knowledge, our research is the first to demonstrate the positive impact of competition as a marketing strategy to promote sustainable behavior. Moreover, it shows that competition motivates in particular pro-selves to act sustainably. This is especially important as pro-selves are generally less concerned about the environment. Furthermore, they are more likely to work in the financial and business sectors – sectors that tend to have a negative influence on sustainability; sacrificing the environment for the sake of economic growth (Bennett et al., 2013; Halicioglu, 2009; Van Lange, Schippers, & Balliet, 2011). Hence, if we are able to mobilize pro-selves to act more sustainably, we can increase the positive impact on the environment. As such, this work contributes to research on effective marketing strategies to enhance pro-social behavior and especially sustainability (Goldstein et al., 2008; Kronrod, Grinstein, & Wathieu, 2012; Luchs et al., 2010; White & Simpson, 2013), carrying meaningful implications for marketers and policy makers.

Conceptual development

Competition

Competition, or the motivation to compete, is a fundamental part of human nature, as it has survival benefits (Buss, 1999). When engaged in competition, people can signal

their skills (e.g., motoric, cognitive, or social) and characteristics (e.g., beauty, strength, or determination) to attract potential mates or gain resources. During the Pleistocene era, when humans lived as hunter-gatherers in Africa, this rivalry occurred via intrasexual selection and intersexual selection. Intrasexual selection refers to competition among members of the same sex to be the best on certain traits that increase competitive ability (e.g., large body size and aggression among males). Intersexual selection refers to competition among members of the same sex to be the best on certain traits that are appreciated by the other sex (e.g., a young and beautiful appearance amongst females; Barrett et al., 2002).

This motivation to compete is mainly subconscious, instinctive, and emotive rather than being based on conscious and purposeful reasoning (Klintman, 2013). Hence, the ubiquity of competition in present times might originate from the fact that competition is such a strong drive of human beings. All over the world competition is strongly present in societies (e.g., beauty contests, sports, elections, grant and applications), although it is likely to be shaped differently across the world due to cultural norms and values. For example, whereas in Western countries competitions to be the slimmest are prevalent, in some African countries, tribes compete to be the fattest (Fahr & Janssen, 2014).

Competition is also a major tenet of market economies and often drives businesses to pursue the largest market share. The downside of competition in the economic sector is that businesses operating in highly competitive markets have negative environmental consequences, such as heightened pressure on natural resources and the use of cheap and polluting energy (Bennett et al., 2013). Previous research simulating the dynamic behavior of heterogeneous fishers has shown that a competitive market led, besides profits for most fishers, to a decline of all fish stocks (BenDor, Scheffran, & Hannon, 2009). Also in other domains it has often been demonstrated that competition is a key driver of environmental problems (Biggs et al., 2013). Multiple scholars in social dilemma literature (dilemmas were selfishness benefits the individual most unless everyone chooses the selfish alternative, in which case the whole group loses; Allison, Beggan, & Midgley, 1996) have found that people often overharvest a common resource pool when they have to compete for its resources

(Van Dijk et al., 1999; De Kwaadsteniet et al., 2006). Especially when there is resource scarcity (i.e., high levels of competition) people overharvest even till the resource itself is completely depleted, as they fear that others would be unwilling to restrain themselves (Van Vugt, 2001; Van Lange, Balliet, Parks, & Van Vugt, 2014). Hence, generalizing these previous findings, competition seems counterproductive in the context of promoting sustainable behavior.

In general, competition provides incentives on a relative rather than an absolute basis (Liu, Geng, & Whinston, 2007). This generates competitive excitement because the outcomes of the competition – different to a challenge – is mainly focused on performing better than others and not on their individual level of performance benchmarked against some absolute criterion (Kalra & Shi, 2001). Moreover, competition comes with benefits, such as prizes/awards (Connelly et al., 2014), entertainment (Chandon, Wansink, & Laurent, 2000), and relative status (Lim, 2010). Due to these properties and the fact that humans are competitive by nature, people are in general highly motivated to join a competition and act according to the competitive demands to obtain most benefits or achieve the competitive goal. For instance, previous research has shown that a web-based competition among medical residents increased their medical knowledge and skills (Kerfoot & Kissane, 2014). In addition, competition among consumers to help solve an innovation-related problem led to a more diverse set of solutions (Terwiesch & Xu, 2008). Hence, competition can be used as a strategy to change people's behavior and generate deep consumer involvement (Kotler, 2000).

Social value orientation as a moderator

Despite humans' competitive nature, people differ in the degree to which they respond to the inborn tendency to compete, depending on their personality characteristics (Buss, 2009; Nettle, 2006). But for whom would competition as a strategy to enhance sustainable behavior be most effective? Social value orientation (SVO) is a well-established personality trait that distinguishes between pro-selves on one end of the spectrum, who are concerned with maximizing their own outcomes, and pro-socials on the other end of the spectrum, who are concerned with maximizing outcomes for the

common good (Messick & McClintock, 1968; Van Lange, 1999). It indicates how people allocate resources between themselves and others and weigh the welfare of others in relation to their own. The behavioral consequences of this personality trait are strongly reflected in people's cooperative and altruistic behavior, as is supported by a meta-analysis of 82 studies (Balliet, Parks, & Joireman, 2009). For instance, pro-socials display more helping behavior by volunteering more hours than pro-selves do (McClintock & Allison, 1989). Similarly, pro-socials donate more money and goods, such as clothes, in comparison to pro-selves (Van Lange et al., 2007).

Sustainable behavior can be perceived as a form of altruism, since it is costly to the individual consumer (e.g., heightened expenses, changing one's habits, and de-consumption) and beneficial to the collective (e.g., reducing climate change, diminishing pollution, and saving natural habitats). Hence, there is some empirical research showing that SVO is indeed related to sustainable behavior. For example, pro-socials show a greater willingness to sign petitions against environmental harm or contribute money to environmental organizations (Joireman et al., 2001; Van Lange et al., 2007). In addition, pro-socials commute more by public transportation as opposed to pro-selves, who prefer commuting by car (Van Vugt et al., 1995). Moreover, pro-selves show less support to a transportation pollution reduction initiative as opposed to pro-socials, due to the perceived high personal costs (e.g., increasing road taxes; Cameron, Brown, & Chapman, 1998). The fact that pro-selves act less sustainably can be explained by their awareness of (negative) consequences it has for themselves. In general, they perceive laws to protect the environment as limiting their own choice and infringing their personal freedom (Gärling, Fujii, Gärling, & Jakobsson, 2003). On the other hand, pro-socials are more aware of the consequences for the common good (e.g., harm to people all over the world and imbalance in nature), which does motivate them to act sustainably.

Across the population, SVO is fairly equally distributed. Half of the population is categorized as pro-selves and the other half is categorized as pro-socials (Au & Kwong, 2004). However, research has shown an asymmetry of SVO in occupational choices. Because of their cooperative nature, pro-socials predominantly work in the social sector (e.g., mental healthcare and education), whereas pro-selves predominantly

work in the economic sector (e.g., business and finance; Van Lange et al., 2011). The latter are occupational domains that more often have a negative impact on sustainability, as business decisions regularly aim to enhance economic growth, causing environmental degradation (Bennett et al., 2013; Halicioglu, 2009). In addition, financial decisions on how to invest money prioritize economic investments over climate endeavors (Skovgaard, 2014). Hence, it is of utmost importance that people that are part of the economic sector and are often driven by self-interest, will make more sustainable decisions.

Since pro-selves focus on maximizing their own profits, it is important to develop sustainable marketing strategies that tap into this innate drive of pro-selves in order to motivate them to behave more sustainably. Some research has already demonstrated that the non-cooperative behavior of pro-selves can be altered when making it beneficial for themselves. For example, pro-selves acted more cooperatively knowing that limited cooperation could lead to punishment (Van Dijk, Cremer, & Handgraaf, 2004) or when a strong group identification led them to perceive group benefits as personal benefits (De Cremer & Van Dijk, 2002).

Why would competition be a successful marketing strategy to foster sustainable actions among pro-selves? Our reasoning for this assumption stems from the fact that competition provides the opportunity to obtain individual benefits. As explained by evolutionary theory, people are innately motivated to compete, sometimes even at the expense of others (e.g., male aggression), as it can result in having more mates and/or resources (Buss, 1999). Moreover, competition provides self-interest benefits such as prizes/awards (Connelly et al., 2014; Terwiesch & Xu, 2008), entertainment (Chandon et al., 2000), and relative status (Griskevicius et al., 2010; Lim, 2010). In the current research we therefore investigate whether promotion of sustainable behavior by means of competition among consumers does lead pro-selves to act more sustainably.

More so, people are motivated to achieve and maintain a self that is positive (Sedikides, 1993). This positive self-image constitutes an index of one's acceptance in the social world (Leary, 1999; Leary, Tambor, Terdal, & Downs, 1995). For pro-socials it is the self-image of being good for others (e.g., acting sustainably). For pro-selves it is the self-image of being better than others (e.g., winning a competition). Hence,

competition in the sustainability domain does resonate with pro-socials who are already intrinsically motivated to behave sustainably, as well as with pro-selves who typically do not behave sustainably.

Overall, we predict that competition has a positive effect on sustainability. In addition, we posit that pro-selves will act more sustainably in a competitive setting as opposed to a control setting, since performing well during a competition provides them the possibility to obtain self-interest benefits. On the other hand, pro-socials are intrinsically motivated to benefit the common good, which makes them act sustainably independent of competition. In sum:

H1: Competition, as compared to no competition, increases sustainable behavior.

H2: The positive effect of competition on sustainable behavior is moderated by social value orientation. Specifically, pro–socials act sustainably in both a competitive and a non–competitive setting, whereas pro–selves only act sustainably in a competitive setting.

Current research

Four studies test the counterintuitive effect of competition on sustainable behavior and how this is moderated by SVO. Study 2.1 tests the basic effect, demonstrating that competition enhances sustainable behavior as compared to a control condition. In addition, the study tests not only intentional behavior but also generalizes to actual sustainable behaviors. Studies 2.2 and 2.3 investigate how SVO moderates the positive effect of competition on sustainable behavior. Specifically, Study 2.2 shows that activating competition in order to increase sustainable behavior is particularly effective for pro-selves. It shows that pro-socials act sustainably independent of competition being activated or not, whereas pro-selves only act sustainably under competition. Study 2.3 rules out central alternative accounts, showing (1) that the effects are not due to merely following the instructions to compete and (2) that competition does not positively influence just any type of behavior and any audience but rather it is domain and audience related. Finally, Study 2.4 tests the external validity of our findings in a

field study using consumer segmentation (economics vs. psychology students) to distinguish across people with varying levels of SVO, rather than directly measuring SVO. Taken together, the current studies demonstrate support for our predictions across different types of intentional and actual sustainable behaviors (shopping for green products, donations, recycling), across different empirical settings and populations (lab, online, field), and across various measurements of SVO.

Study 2.1: Competition and sustainability

Study 2.1 adopted a controlled experimental design, testing the causal link between competition and sustainable behavior. Specifically, we investigated whether sustainable behavior increases after competition is activated as compared to a control condition. We tested the effect of competition on sustainability on a broad range of sustainable behaviors: intentional sustainable grocery shopping, monetary donations to WWF, and actual recycling behavior.

Method

Participants and design. Two hundred undergraduate business school students (M_{age} = 19.26, *SD* = 1.44; 44.0% female) took part in the experiment for course credits. After giving their informed consent, they were randomly allocated to one of the two conditions of a two group (competition vs. control) between-subjects design.

Procedure and materials. Participants were first asked to read and write about a fictitious sustainable initiative from the University's Green Office (the sustainability platform of the university). Participants in the competition condition read: "The Green Office wants to promote sustainable behavior among students. In doing so, it wants to introduce a sustainability competition. In this competition, students can compete to become the most sustainable student of the business school. Each period a new round of competition will be initiated and a winner will be announced. Now, think about how you could win the competition and become the most sustainable student at the business school." Participants in the control condition read: "The Green Office wants

to promote sustainable behavior among students. In doing so, it wants to introduce a discussion group. In this discussion group, students participate in discussions about the sustainability issue at hand. Each period a new discussion session will be initiated and the key points of previous discussions will be announced. Now, think about how you could become a more knowledgeable student on the topic of sustainability at the business school." Thereafter participants were asked to write down their thoughts as detailed as possible in about 2-3 minutes.

Subsequently, sustainable behavior was measured with a shopping and a donation task (in counterbalanced order). In the shopping task we measured participants' general preference for sustainable groceries. Participants saw ten different grocery products (apples, cheese, etc.). For each product, a conventional and a sustainable option was provided, accompanied with its actual price to indicate how much the products cost and differ in price (e.g., conventional apples 1.33 euro per Kg and sustainable apples 3.79 euro per Kg). They were asked to pick five out of the twenty optional grocery products and to put them into a fictitious shopping basket. In order to not influence any other driving motivational aspects, such as monetary concerns, no restrictions about how much money they could spent or other instructions were provided. The number of sustainable products put into the basket served as our dependent variable.

In the donation task, participants were informed that 25 euros would be given to four randomly selected participants after the experiment was completed. They were then asked, if they would win the 25 euros, how much of this money they would like to keep for themselves and how much they would be willing to donate to the World Wide Fund (WWF).[1] The amount of money (in euros) participants were willing to donate to WWF served as our dependent variable. After the donation task, participants answered some demographic questions and had to indicate their agreement with the manipulation check statement on a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*): "The initiative from the University's Green Office involved a competition."

To measure recycling behavior, participants were given a small piece of paper at the beginning of the experiment. During the experiment they were asked twice to write

down a three-digit number on this piece of paper. As a cover story, participants were told that this was done to check their attention. At the end of the experiment, participants were asked to come to the experimenter and throw away the piece of paper in a bin on the way out from the lab. Two identical bins were put next to the exit of the lab, one with a sign for waste and one for paper (see Picture 2.1). Whether the paper bin stood left or right from the waste bin was counterbalanced across time slots in which the experiment took place. Participants then chose in which bin to throw their piece of paper. Whether participants threw the paper in the paper bin (recycling) or not (no recycling), served as our dependent variable.

Results

Manipulation check. Univariate analysis revealed that the manipulation of competition was successful. Within the competition condition participants indicated to a higher extent that the initiative from the University's Green Office involved a competition (M = 5.28, SD = 1.35) than participants in the control condition (M = 3.66, SD = 1.52), $F(1, 198) = 63.59$, $p < .001$, part. $\eta^2 = .24$.

Shopping task. Univariate analysis revealed the hypothesized main effect of condition, $F(1, 196) = 5.78$, $p = .02$, part. $\eta^2 = .03$. No main effect of order in which the shopping and donation task appeared, $F(1, 196) = 0.03$, $p = .86$, part. $\eta^2 < .001$and no interaction between order and condition was found, $F(1, 196) = 1.78$, $p = .18$, part. $\eta^2 = .01$. As predicted, participants in the competition condition added more sustainable products to their shopping basket (M = 1.91, SD = 1.75) than participants in the control condition (M = 1.37, SD = 1.40).

Donation to WWF. Univariate analysis revealed no main effect of condition, $F(1, 196) = 1.81$, $p = .18$, part. $\eta^2 = .01$ and no main effect of order, $F(1, 196) = 0.22$, $p = .64$, part. $\eta^2 = .001$. There was however a marginal significant interaction between order and condition, $F(1, 196) = 3.02$, $p = .08$, part. $\eta^2 = .02$. Simple effect tests showed that participants in the competition condition donated significantly more money to WWF (M = 10.25, SD = 8.91) than in the control condition (M = 6.78, SD = 7.37) when the donation task came first, $F(1, 196) = 4.75$, $p = .03$, part. $\eta^2 = .02$. This effect was

neutralized when the shopping task preceded the donation task, $F(1, 196) = 0.08$, $p = .78$, part. $\eta^2 < .001$. This order effect is most likely due to the lengthiness of the shopping task, weakening the competition-prime.

Recycling behavior. A binomial logistic regression showed that in the competition condition a significantly higher proportion of participants recycled their paper (98.0%) than in the control condition (92.0%), $\chi^2(1, N = 200) = 4.04$, $p = .04$, Nagelkerke $R^2 = .06$. This shows that, despite the fact that recycling behavior seems to be the norm (92% percent recycled in the control condition), competition can increase recycling behavior even further.

Picture 2.1 *The two identical waste and paper bin that were used to measure participants' recycling behavior*

Discussion

The findings of Study 2.1 demonstrate the positive effect of competition on sustainable behavior in a controlled setting. The generalizability of the effect was demonstrated across three different types of sustainable behavior: buying intentions of sustainable grocery products, donations to WWF (but only when the donation task came before the shopping task), and actual recycling behavior. These findings indicate that competition can be an effective marketing strategy encouraging sustainable behavior.

Study 2.2: Moderating role of social value orientation

Study 2.2 extends Study 2.1 by examining how SVO, which distinguishes between pro-selves and pro-socials, moderates the effect of competition on sustainable behavior. Due to their concerns to maximize outcomes for the common good, we predict that pro-socials act sustainably in both competitive and non-competitive settings. Pro-selves, on the other hand, are concerned to maximize outcomes for themselves. Hence, we predict that they only act sustainably in competitive settings, as it taps into their intrinsic drive to benefit the self. In other words, activating competition in order to increase sustainable behavior is particularly effective for pro-selves.

Method

Participants and design. Three hundred thirty-two undergraduate students (M_{age} = 20.01, *SD* = 1.89; 30.4% female) took part in an experiment for course credits. After giving their informed consent, they were randomly allocated to one of the two conditions of a two group (competition vs. control) between-subjects design.

Materials. To measure social value orientation the Slider Measure of SVO was used (Murphy, Ackermann, & Handgraaf, 2011). This measure comprises six items with nine different continuous self-other payoff combinations (e.g., [50,100], [54,89], …, [81,26], [85,15]). How people allocate the specified points between themselves and an anonymous person, determines how people weigh the welfare of others in relation to

the welfare of themselves. For instance, the choice of own outcome being 54 and other's outcome being 89 is considered to be more pro-social and the choice of own outcome being 81 and other's outcome being 26 to be more pro-self. Based on the six allocations people make, we calculated a continuous SVO score (SVO = arctan $[(x_{other} - 50)/(x_{self} - 50)]$). Lower scores indicate a more pro-self orientation and higher scores indicate a more pro-social orientation. Within our sample, 52.7% of the participants were classified as pro-selves ($N = 175$), and 47.3% as pro-socials ($N = 157$).

Procedure. Participants were first asked to fill out the SVO measure. Thereafter, they were randomly assigned to either the competition or control condition. In both conditions participants were informed about a fictitious sustainable initiative from a coffee store on campus (Doppio Espresso). Participants in the competition condition read: "Doppio Espresso has started a competition to foster sustainable behavior. The goal of the competition is to make customers compete to reduce most waste by bringing their own reusable coffee cups. Start joining the competition by reducing most waste and win the sustainability competition. Each week Doppio will announce the winner of the competition." Participants in the control condition read: "Doppio Espresso has started an initiative to foster sustainable behavior. The goal of the initiative is to make customers reduce waste by stimulating them to bring their own coffee cups. Start joining the initiative and help reduce waste to foster a sustainable world. Each week Doppio will announce how much waste is reduced in total."

In order to measure participants' sustainable behavior, they were asked to indicate on a Likert scale how much they were willing to buy a reusable coffee cup, from 1 (*not at all willing*) to 7 (*very willing*). Then, participants were asked to indicate as manipulation check the extent in which they agreed with the following statement "The initiative from Doppio Espresso involved a competition", from 1 (*strongly disagree*) to 7 (*strongly agree*), As control variables, participants were asked to indicate how much they like coffee, from 1 (*not at all*) to 7 (*very much*) and their evaluation of Doppio Espresso, from 1 (*very negative*) to 7 (*very positive*). Finally, participants had to answer some demographics.

Results

Manipulation check. Univariate analysis revealed that the competition manipulation was successful. Within the competition condition participants indicated to a higher extent that the initiative from Doppio Espresso involved a competition (M = 4.72, SD = 1.73) in comparison to the control condition (M = 2.82, SD = 1.67), $F(1, 330) = 103.14$, $p < .001$, part. $\eta^2 = .24$.

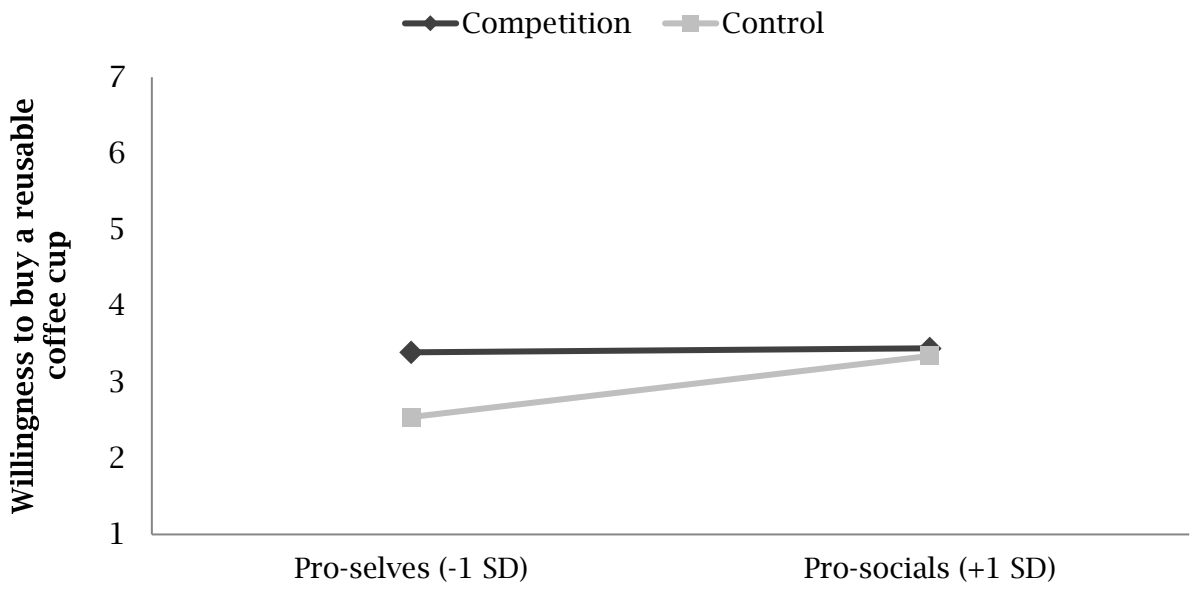
Willingness to buy a reusable coffee cup. Univariate analysis revealed a significant main effect of condition, $F(1, 328) = 5.13$, $p = .02$, part. $\eta^2 = .02$, a significant main effect of SVO, $F(1, 328) = 4.17$, $p = .04$, part. $\eta^2 = .01$, and a marginal significant interaction effect between condition and SVO, $F(1, 328) = 3.32$, $p = .07$, part. $\eta^2 = .01$.[2] As predicted, participants in the competition condition were more willing to buy a reusable coffee cup (M = 3.42, SD = 2.03) compared to participants in the control condition (M = 2.95, SD = 1.80). In addition, the more pro-social participants were, the more they were willing to buy a reusable coffee cup (b = 0.01).

To get a deeper insight into the interaction between condition and SVO, a spotlight analysis was conducted, utilizing the continuous SVO data at one standard deviation below the mean level of SVO (pro-selves) and at one standard deviation above the mean level of SVO (pro-socials). This enabled us to statistically test whether there is a significant difference between condition on the willingness to buy a reusable coffee cup among pro-selves and pro-socials (Fitzsimons, 2008). In our population, the value of SVO (angle degree) one *SD* below the mean was 7.86°, which falls in between the boundaries of the category of pro-selves (ranging from 22.45° to -12.04° and lower, Murphy et al., 2011). The value of SVO one *SD* above the mean was in our population 34.57°, which falls in between the boundaries of the category of pro-socials (22.45° to 57.15° and higher, Murphy et al., 2011).

The analyses revealed that pro-selves were more willing to buy a reusable coffee cup in the competition condition than in the control condition, $b = 0.43$, $t(328) = 2.89$, $p = .004$. On the other hand, pro-socials did not demonstrate a difference in their willingness to buy a reusable coffee cup depending on condition, $b = 0.05$, $t(328) = 0.31$, $p = .76$. In addition, in the competition condition there was no difference in willingness

to buy a reusable coffee cup between pro-selves and pro-socials, b = 0.002, t(328) = 0.16, p = .87. In the control condition pro-socials were more willing to buy a reusable coffee cup in comparison to pro-selves, b = 0.03, t(328) = 2.64, p = .009. Figure 2.1 shows the willingness to buy a reusable coffee cup for both the control and competition conditions moderated by SVO.

Figure 2.1 *The effect of competition on the willingness to buy a reusable coffee cup moderated by SVO*



Control variables. When the control variable "liking coffee" was included as a covariate, results revealed a main effect of liking coffee on the willingness to buy a reusable cup, F(1, 327) = 22.83, p < .001, part. η^2 = .07. Importantly, the main effects of condition and SVO remained significant, F(1, 327) = 7.16, p = .01, part. η^2 = .02; F(1, 327) = 3.80, p = .05, part. η^2 = .01 and the interaction remained marginally significant, F(1, 327) = 3.69, p = .06, part. η^2 = .01. When evaluation of the coffee shop Doppio Espresso was included as a covariate, results revealed a main effect of evaluation of the coffee shop Doppio Espresso on the willingness to buy a reusable cup, F(1, 327) = 30.53, p < .001, part. η^2 = .09. Again, the main effects of condition and of SVO remained significant, F(1, 327) = 8.00, p = .01, part. η^2 = .02; F(1, 327) = 4.89, p = .03, part. η^2 =

.02, and the interaction between condition and SVO remained marginally significant, $F(1, 327) = 2.82$, $p = .09$, part. $\eta^2 = .01$.

Discussion

Study 2.2 demonstrates, as predicted, that the positive effect of competition on sustainable behavior is moderated by SVO. It shows that the increase of sustainable behavior under competition is especially effective for pro-selves. As pro-socials are intrinsically more motivated to serve the common good, they act sustainably independent of competition, whereas pro-selves act sustainably only in a competitive setting. This finding implies that through the activation of competition, a wider range of people can be mobilized to act sustainably, including those people who are typically not concerned with serving the common good and often maximize their own outcomes (pro-selves).

Study 2.3: Self–interest versus social–interest competition

The positive effect of competition on sustainable behavior in Studies 2.1 and 2.2 may be alternatively explained by two accounts. First, it is possible that performance was merely due to following the instructions to compete. Second, plausibly any type of desired behavior that is promoted through competition – aimed at any type of audience – will be positively influenced, not just sustainable behavior. Study 2.3, therefore, extends Study 2.2 by ruling out these alternative accounts and show that the effectiveness of competition is domain and audience related. Specifically, we investigate here the effect of competition in a non-sustainability domain, comparing it to a sustainability domain, while testing effectiveness across pro-selves and pro-socials. An especially useful desired behavior to compare sustainability to is leadership. Our society is positively biased towards leaders and often has a positive view of leadership roles (Van Vugt, Hogan, & Kaiser, 2008). Hence, we compare a competition in a sustainable domain with a competition in a leadership domain. A key difference however between leadership and sustainability is that the latter is first and foremost a

social-interest-driven goal that will benefit society, while the former is first and foremost a self-interest-driven goal that will benefit the individual. If the results would only be driven by demand characteristics (i.e., merely following the instructions of the competition) and if competition is generally effective, people (both pro-selves and pro-socials) would perform equally well in both domains after activation of competition.

Method

Participants and design. One hundred seventy-four M-Turk participants (M_{age} = 36.64, *SD* = 12.04; 47.1% female) took part in a 2 (condition: leadership competition vs. sustainable competition) x 2 (SVO: pro-selves vs. pro-socials) between-subjects design study. After giving their informed consent, they were randomly allocated to either the leadership competition or the sustainable competition condition.

Materials. To measure participants' SVO we used the extended triple-dominance questionnaire of social values (Eek & Gärling, 2006). In the measurement, the four SVO types are represented by four alternatives of point division between oneself and another, for example: own outcome 500 and other's outcome 100 (competitor), own outcome 560 and other's outcome 300 (individualist), own outcome 500 and other's outcome 500 (pro-social), and own outcome 500 and other's outcome 800 (altruist). Participants saw these four alternative point divisions simultaneously and had to indicate which they preferred most. This was done during several rounds (each round presented slightly different point divisions). When a participant consistently preferred one of the four alternatives in at least two-thirds of their choices they could be classified as belonging to one of the SVO types (see also Van Lange, Otten, De Bruin, & Joireman, 1997). Within our sample, 9.8% of the participants were classified as competitors (*N* = 17), 40.8% as individualists (*N* = 71), 35.6% as pro-socials (*N* = 62), and 7.5% as altruists (*N* = 13). Following SVO literature, competitors and individualists were averaged and re-classified as pro-selves (*N* = 88, 54%), and pro-socials and altruists were averaged and re-classified as pro-socials (*N* = 75, 46%) to overcome the extremely unequal group sizes (Au & Kwong, 2004; Balliet & Joireman, 2010; Bogaert, Boone, & Declerck, 2008).

Procedure. Participants read the instructions corresponding the condition (leadership vs. sustainable competition) they were assigned to: "Within this study you will take part in a leadership (green) game where you have to compete with other players. People who are more successful in this game tend to be more successful in becoming a leader of a group (preserving the ecological environment) than people who are less successful in this game. A key reason is that competing well and being successful in this game is related to a high level of abstract thinking, which is beneficial for gaining a leadership position (effective environmental preservation)." Then we measured participants' performance in the competition with a neutral task to keep it similar across both conditions (enabling us to compare participants' behavior). This neutral task consisted of 6 anagrams. An anagram is a word game in which players have to build a word formed from another word by rearranging its letters. For example, "resist" is an anagram of "sister." Such a task is often used in research to measure people's motivation and goal attainment (Shah, Higgins, & Friedman, 1998). The anagrams used for this study were: grown-wrong, fringe-finger, former-reform, hinge-neigh, married-admirer, and toaster-rotates. Participants were instructed that if they were unable to solve the anagram, they could skip to the next anagram, but that this would lower their performance in the overall competition. Performance was measured by the number of anagrams solved correctly. The more anagrams participants solved, the more motivation they exhibited to win either the leadership competition or the sustainable competition. Thereafter, participants had to answer the extended triple-dominance questionnaire of social values (Eek & Gärling, 2006) in order to assess their SVO. Subsequently, participants had to answer the manipulation check question: "The goal of the competition within this study was about…" on a 9-point scale with the labels *environment* (1) and *leadership* (9) at the endpoints. Finally, participants had to answer some demographic questions.

Results

Manipulation check. The amount of anagrams participants solved correctly was M = 3.94 (SD = 1.73). Univariate analysis revealed that the manipulation was successful. Within the sustainable competition condition participants were more likely to indicate

that the competition was about the environment (M = 2.57, SD = 2.53), whereas participants in the leadership competition condition were more likely to indicate that the competition was about leadership (M = 8.47, SD = 1.34), $F(1, 172) = 363.79$, $p < .001$, part. $\eta^2 = .68$.

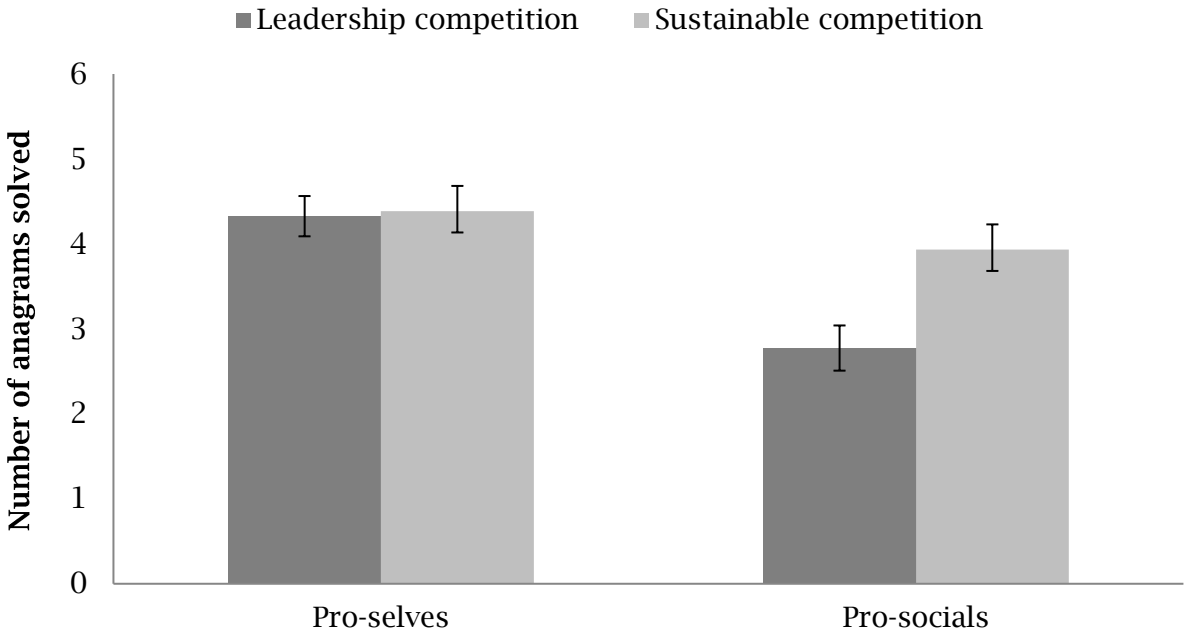
Anagram task performance. Univariate analysis of the anagram task performance revealed a main effect of competition type, $F(1, 159) = 5.31$, $p = .02$, part. $\eta^2 = .03$, a main effect of SVO, $F(1, 159) = 14.44$, $p < .001$, part. $\eta^2 = .08$, and an interaction effect between condition and SVO, $F(1, 159) = 4.34$, $p = .04$, part. $\eta^2 = .03$. Specifically, simple effect tests show that pro-selves solved more anagrams correctly in the leadership competition (M = 4.33, SD = 1.55) as opposed to pro-socials (M = 2.77, SD = 1.82), $F(1, 159) = 16.60$, $p < .001$, part. $\eta^2 = .10$. No difference between pro-selves and pro-socials was found for the sustainable competition (respectively, M = 4.38, SD = 1.74; M = 3.93, SD = 1.59), $F(1, 159) = 1.54$, $p = .22$, part. $\eta^2 = .01$. Moreover, no difference was found between the sustainable and leadership competition among pro-selves, $F(1, 159) = 0.03$, $p = .87$, part. $\eta^2 < .001$. On the other hand, among pro-socials there was a difference, $F(1, 159) = 8.84$, $p = .003$, part. $\eta^2 = .05$. Pro-socials solved more anagrams correctly in the sustainable competition as opposed to the leadership competition. Figure 2.2 on the next page shows the performance during the competition for each competition type moderated by SVO.

Discussion

Study 2.3 demonstrated that the activation of competition motivates pro-selves to act independent of the goal, whereas pro-socials are only motivated to act when the competition endorses a goal of their interest. These results illustrate two things. First, they show that our findings cannot be alternatively explained by demand characteristics, as instructions of the competition condition did not increase behavior per se. Second, the findings demonstrate that competition works better for a social (sustainable) goal than for the self-interest (leadership) goal. This is due to the intrinsic preferences that drive people's behavior. The performance of pro-socials depends on whether the goal of a competition can help maximize outcomes for the common good: enhancing sustainability (but not gaining a leadership position). On the other hand,

pro-selves would perform well within any type of competition, due to their general motivation to win.

Figure 2.2 *The effect of competition type on performance (number of anagrams solved) moderated by SVO*



Note. Error bars indicate +/- one standard error of the mean.

Study 2.4: Field study

In order to investigate the moderating role of people's level of self-interest versus social-interest on the relationship between competition and sustainable behavior, Studies 2.2 and 2.3 both used a well validated measurement of SVO. This measurement is, however, not directly implementable in a real-life marketing setting. Hence, in Study 2.4 we make use of a natural segmentation that distinguishes between pro-selves and pro-socials: the economic sector (e.g., economics students) versus the social sector (e.g., psychology students) respectively. Previous research has shown that these two student groups can be used as a proxy for pro-selves vs. pro-socials, as economics students

maximize their own outcomes, whereas psychology students maximize the outcomes of the group (Van Lange et al., 2011). We investigated the effects of competition on the amount in which students clicked on an email sent out to promote a sustainable initiative of the University's sustainability platform, and how this effect was moderated by department (economics versus psychology). Specifically, it is expected that economics students' engagement with the sustainability-related message will be higher after competition is activated relatively to a control, whereas psychology students' engagement will be high independent of competition.

Method

Participants and design. Eleven hundred thirty-one undergraduate students took part in the study. It involved a 2 (condition: competition vs. control) x 2 (department: economics vs. psychology) between-subjects design.

Procedure. An email from the economics department of a university was sent to undergraduate economics students (N = 536), who were randomly assigned to either the competition or control condition. An email from the psychology department of the same university was send to undergraduate psychology students (N = 595), who were also randomly assigned to either the competition or control condition. The email was titled "Join the green competition (initiative) of the economics (psychology) department." This was followed by the text: "As the economics (psychology) department we want to promote sustainable behavior among our students. In doing so, we want to introduce the green competition (initiative) that is organized by the Green Office. Join this competition (initiative) and try to become the most (a more) sustainable economics (psychology) student!" Students could then click through to be informed about the possibilities at the University to become more sustainable, such as buying an organic food box or volunteering for the Green Office. As very limited amount of students clicked through (0.8% (economics) and 1.3% (psychology), opening the email served as our dependent variable.

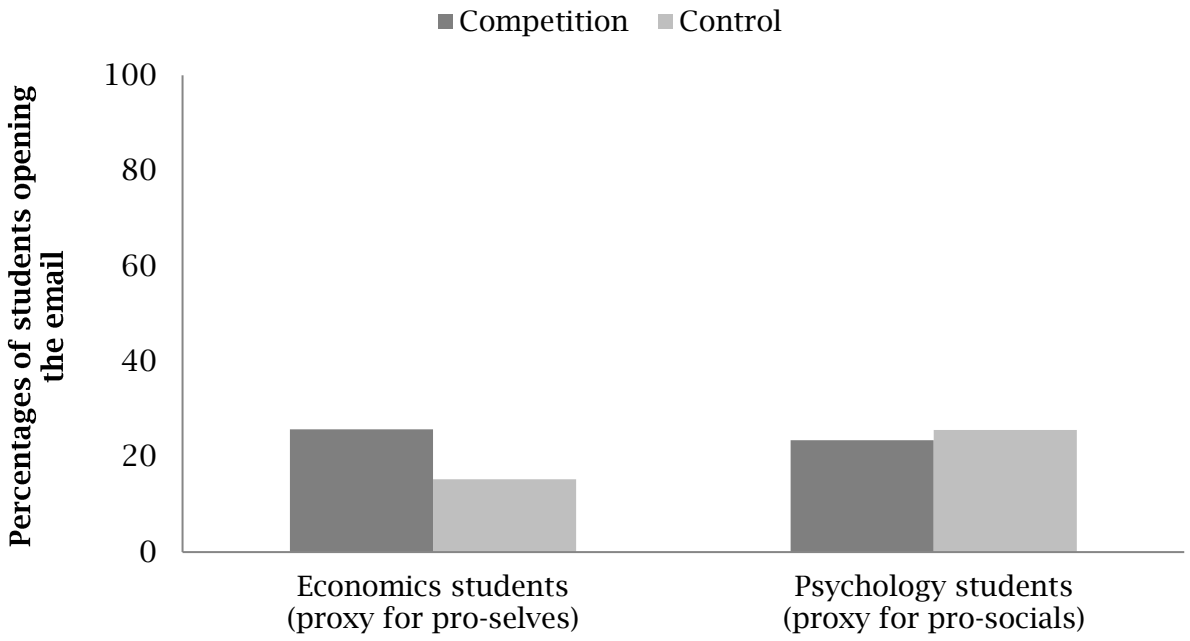
Results

Email opening. Binomial logistic regression analysis revealed a marginally significant main effect of condition, $\chi^2(1, N = 1131) = 3.43$, $p = .06$, and a marginally significant main effect of department, $\chi^2(1, N = 1131) = 3.22$, $p = .07$. As predicted, students in the competition condition opened the email more often (24.6%) compared to students in the control condition (20.7%). Psychology students opened the email more often (24.5%) compared to economics students (20.5%). Furthermore, results revealed a significant interaction effect between condition and department, $\chi^2(1, N = 1131) = 6.92$, $p = .01$. Specifically, economics students opened the email more often in the competition condition (25.7%) than in the control condition (15.3%), $\chi^2(1, N = 536) = 8.80$, $p = .003$, whereas no difference between conditions was found for psychology students (respectively, 23.5% and 25.6%), $\chi^2(1, N = 595) = 0.35$, $p = .55$. In addition, psychology students opened the email more often than economics students in the control condition, $\chi^2(1, N = 565) = 8.92$, $p = .003$, whereas no difference between psychology and economics students was found in the competition condition, $\chi^2(1, N = 566) = 0.39$, $p = .53$. Figure 2.3 shows the frequency of opening the email for both the control and competition conditions moderated by whether students are more pro-selves (economics students) or more pro-socials (psychology students).

Discussion

The goal of Study 2.4 was to replicate the findings of Study 2.2 in a real life setting, using a natural segmentation that distinguishes between pro-selves and pro-socials. Consistent with Study 2.2, the findings show that a competitive setting motivates both pro-selves (economics students) and pro-socials (psychology students) to behave sustainably, whereas a control setting only motivates pro-socials. This indicates that competition can motivate a much larger portion of the population to behave sustainably. Furthermore, competition seems to be a successful marketing strategy to encourage sustainable behavior of those people that tend to work in sectors (financial and business) that generally are less concerned with sustainability.

Figure 2.3 *The effect of competition on opening the email for economics students and psychology students*



General discussion

The environmental problems the world faces today are serious and complex. Therefore, it is of great importance to persuade consumers to act in a sustainable manner. This is a challenging task, as a gap often remains between intentions to act sustainably and actual sustainable behavior for the majority of consumers (Csutora, 2012; Kennedy et al., 2009; Luchs et al., 2010). The current research takes a counterintuitive approach by investigating how competition – that is often associated with environmental problems – can actually promote sustainable behavior. In particular, competition can be employed as a marketing strategy that appeals to pro-selves that are not motivated to act sustainably and that are often neglected as a consumer segment by sustainable marketers and policy makers.

Four studies yielded results that supported our predictions. Study 2.1 showed that competition enhanced both intentional (preference for sustainable grocery

products over non-sustainable grocery products) and actual (donation to WWF and recycling) sustainable behaviors. Study 2.2 showed that the effect of competition on sustainable behavior is moderated by SVO. Results showed that pro-socials always act sustainably, as such behavior fits well with their social nature, whereas pro-selves only act sustainably when competition is involved. Study 2.3 ruled out the fact that the findings of Studies 2.1 and 2.2 are merely driven by the demand characteristic of following the instructions to compete and the idea that any type of behavior can be positively influenced through competition. Moreover, it demonstrated that using competition as a marketing strategy is more effective to motivate people to become more sustainable than to become a leader, even though people are generally positively biased towards leaders and often have a positive view of leadership roles (Van Vugt et al., 2008). Finally, Study 2.4 tested the external validity of our findings in a field study. It showed that people who pursue a career in the business or finance sectors (i.e., economists; a useful consumer segmentation of pro-selves) are more motivated to act sustainably by means of competition, whereas people who pursue a career in the behavioral and mental health sectors (i.e., psychologists; a useful consumer segmentation of pro-socials) are motivated to act sustainably independent of a competitive setting.

Theoretical implications

Scholars acknowledge the fact that it is of paramount importance to enhance people's sustainable behavior (Gardner & Stern, 2002; Penn, 2003; Spence et al., 2012). However, marketing or persuasion strategies to promote sustainable behavior often result in an intention-behavior gap: yielding an increase in environmental values and intentions but not behavior (Dietz et al., 2003; Luchs et al., 2010). Contributing to the theoretical development in consumer persuasion and pro-social marketing, the current research has taken a novel approach by studying the effectiveness of using competition as a marketing strategy to enhance sustainable behavior. Although counterintuitive – as competition is often associated with non-sustainable behavior – we show that it promotes sustainable actions.

Two theoretical explanations are at the heart of the effectiveness of this marketing strategy, highlighting the theoretical relevance of our work. First of all, since competition taps into people's innate motivation to compete, it is a more unconscious appeal to sustainable actions and not a conscious moralistic appeal to change sustainable attitudes and behavior (Buss, 1999; Klintman, 2013). As these innate motives are strong drivers of behavior they might be more successful to help narrow the intention-behavior gap in the sustainability context (Csutora, 2012; Kennedy et al., 2009; Luchs et al., 2010). Moreover, tapping into people's innate motivations is especially relevant as many persuasion strategies to influence people's sustainable behavior do not match with humans' evolved behavioral tendencies and are therefore ineffective (e.g., asking people to value the collective interest over the individual interest or asking people to value future needs more than current needs; Griskevicius et al., 2012; Penn, 2003). Because of its focus on competition, the current research importantly extends previous work of Griskevicius and colleagues (2010). Their research shows that status can motivate people to act sustainably, but that this positive effect only holds when behavior is publicly displayed. By using competition as a marketing strategy, our work demonstrates however that sustainability can be increased not just in a public setting, but also privately. Hence, activating people's innate drive to compete seems to be a strategy influencing people's motivation more generally. Overall, integrating evolutionary theory in marketing research fits well with recent calls to further explore the role of an evolutionary perspective in consumer behavior and specifically in the sustainability domain (Hantula, 2003; Pham, 2013).

Second, as competition fosters self-interest benefits (e.g., prizes, relative status, and entertainment) it appeals to a much wider consumer population. In our work, we make the useful distinction between pro-selves and pro-socials, based on the established SVO literature, and highlight the fact that the behavioral motivations of the different segments of people are driven by different goals: maximizing own benefits versus maximizing benefits for the common good, respectively. Other previous work, that studied marketing solutions for sustainability, did not look at these individual differences thus far (Kronrod et al., 2012; Luchs et al., 2010; White & Simpson, 2013). Moreover, research on sustainable marketing often emphasizes theoretical paradigms and strategies that preach to the choir (i.e., pro-socials) by focusing mainly on the social

aspects of sustainability (Gardner & Stern, 2002; Griskevicius et al., 2012; Penn, 2003). Yet, we provide evidence that competition is a strategy that even mobilizes pro-selves, who typically pursue self-interest goals or are less sympathetic towards the sustainability issue, to act sustainably. This is in line with previous research, demonstrating that pro-selves' non-cooperative behavior can be altered by making it beneficial for themselves (Van Dijk et al., 2004; De Cremer & Van Dijk, 2002).

Finally, we show that SVO is an important boundary condition to the success of competition as a marketing strategy. Prior work highlighted the view that competition can motivate all people to change their behavior and act accordingly to the goal of the competition (Kerfoot & Kissane, 2014; Terwiesch & Xu, 2008). This positive response to competition is expected from the accompanied benefits such as prizes/awards (Connelly et al. 2014), entertainment (Chandon et al., 2000), and relative status (Griskevicius et al., 2010; Lim, 2010). However, according to our findings these propensities motivate pro-selves, but not pro-socials. Pro-socials only seem to be motivated to act according to the competition when the goal of the competition serves the common good (i.e., sustainability goal), not when it benefits the individual interest (i.e., leadership goal). Hence, we demonstrate that the effectiveness of competition as a marketing strategy depends on both the targeted population and on the goal of the competition.

Managerial and policy implications

The key success factor of the current strategy to use competition to increase sustainability lies in reaching a broader public. Doing well in a competition results in benefits for the individual, which makes behaving sustainably, besides pro-socials, also attractive to pro-selves. In addition, although pro-socials are not intrinsically motivated to compete, they do respond positively to a competition within sustainable domain as it fosters outcomes for the common good. Hence, sustainable competition is of interest to both pro-selves and pro-socials.

These findings may offer significant implications for marketers, public policy makers, and NGOs that are interested in promoting sustainability. For instance, to

persuade consumers to act more sustainably, marketing strategies and policies can make use of competition. One can think, for example, of a CO_2 reduction competition among employees commuting to work (e.g., CO_2 fit app[3]), an energy reduction competition among households on a specific street, or a competition for the cleanest neighborhood. A competition might also be motivational for promoting sustainable products. For example, announcing a public competition to create the best logo on a sustainable sweater or t-shirt. Especially, companies that have more self-interested customers (e.g., private banking) and want to sell sustainable products or services, may benefit from using competitive elements in their marketing strategies.

Besides consumer contexts, competition as a strategy may also be useful in political and policy contexts. A competition is held every year for being the greenest city or village within Europe (Entente Florale Europe[4]) to foster more sustainable policies within municipalities. Since drought is a rising problem due to climate change, competition to use the smallest amount of water among community members might help reduce water shortages (Shower With Friends[5]). Moreover, within an educational context, competition in the form of a game can be used to teach children about sustainability problems and let them, for example, compete to maximize waste reduction through recycling.

Additional implication involves customer segmentation based on SVO. Our research shows that SVO is a useful customer segmentation to consider within pro-social marketing efforts, as it distinguishes between different motivational goals. As such, it could explain why some strategies are more or less successful. In addition, SVO relates to typical demographic variables. For example, prevalence of pro-socials increases from early adulthood to middle adulthood and old age (Van Lange et al., 1997). Education/career choices depict general differences regarding SVO as well, as pro-selves are more prevalent among economics students as opposed to psychology students (Van Lange et al., 2011) – a segmentation approach we successfully applied in the current research. Finally, in the context of political preferences, prevalence of pro-socials is higher among liberals as opposed to conservatives (Van Lange, Bekkers, Chirumbolo, & Leone, 2012).

Limitations and future research directions

In all our studies we examined sustainable behavior of individuals. Since competition also strongly exists between groups, extending from individual behavior towards group behavior, by studying, for example, the effect of competition at the company or team level, would be a valuable contribution to the literature. Potentially, a relevant step in that direction can be found in studying the Dow Jones Sustainability Index, as it functions as an implicit form of competition among companies to become the most sustainable company and gain the highest ranking. Similarly, sustainable competition between groups in non-organizational social contexts may be valuable to study. For example, the role of competition among neighborhoods, schools, and countries.

We reported multiple types of sustainable behavior: demonstrating actual recycling behavior (Study 2.1), donating to a sustainable cause (Study 2.1), intentional consumption of sustainable products (Studies 2.1 and 2.2), and engagement intention regarding a sustainable initiative (Study 2.4). Despite the broad range of sustainable outcomes, future work could study the impact of competition on specific types of sustainable behavior to identify which competitive elements and type of sustainable behavior have the best fit. For example, competition between groups might be more relevant for conservation (e.g., recycling and energy saving) as one can easily set group goals and work together towards those goals. On the other hand, competition between individuals might be more relevant for sustainable consumption (e.g., driving electric car and having solar panels) as sustainable consumption can be used as a costly signal (Griskevicius et al., 2010; Van der Wal, Van Horen, & Grinstein, 2016). Moreover, it would be particularly interesting to study the effect of competition on de-consumption, an especially difficult challenge for policy makers (Grinstein & Nisan, 2009).

Since the current research looked at the immediate effect of competition on sustainable behavior, there is so far no evidence for the long-term effect of competition. It would be important to know for how long the effects of a competition last before habituation takes place. Thus, studying how competitions affect behavior over time would be a fruitful avenue for future research. Related to this, a question of interest is how people behave outside the competitive setting and if some people, perhaps pro-selves more so than pro-socials, are more likely to demonstrate subsequent biases. One

plausible bias that comes to mind is the licensing effect, where people behave less morally after doing good (Mazar & Zhong, 2010). Researchers have already shown that people who are not intrinsically motivated to act sustainably (in our study – pro-selves) use their sustainable behavior to license non-sustainable actions that follow (Meijers, Verlegh, Noordewier, & Smit, 2015). Still, we believe that in a competitive setting, such a licensing effect is less likely to occur, as people act sustainably because of their innate motives (being competitive) and not due to moral motives.

Conclusion

Competition can enhance sustainable behavior. Importantly, competition even persuades pro-selves to act more sustainably and by doing so, it reaches out to a broader public. Our findings indicate the importance of using people's SVO as a customer segmentation, as pro-selves and pro-socials are driven by different motivations to act sustainably. Overall, sustainable competition can be seen as a successful marketing strategy to increase sustainable behavior that might contribute to the efforts to address the environmental problems we all face today.

Chapter 3

The paradox of "green to be seen": Green high-status shoppers excessively use (branded) shopping bags

Abstract

This research conceptually replicates, in a real-world setting, prior lab findings showing that status motives make people publicly display sustainable behavior. The results show that shoppers of a high-status sustainable grocery chain display sustainable shopping more by using branded shopping bags than shoppers of a lower-status chain. Extending previous findings, we demonstrate the non-sustainable costs of acting sustainably for status reasons: high-status "green" shoppers are more likely to buy new bags rather than bring their own.

This chapter is based on Van der Wal, A. J., Van Horen, F., & Grinstein, A. (2016). The paradox of "green to be seen": Green high-status shoppers excessively use (branded) shopping bags. *International Journal of Research in Marketing, 33*, 216-219. http://dx.doi.org/10.1016/j.ijresmar.2015.11.004

Introduction

Acquiring social status (hereafter referred to as "status") is an innate human motive due to its evolved advantages, as it is associated with higher ranking within the hierarchy, greater resource entitlement, and sexual opportunity (Kenrick et al., 2010). Status can be attained by control of economic resources, political or military power, legitimate authority, or by having valued skills or knowledge (Colarelli & Dettmann, 2003). In addition, and counterintuitively, people can gain status by acting altruistically: a behavior that benefits others but is costly to oneself (Hardy & Van Vugt, 2006).

One way to become most altruistic is by displaying sustainable behavior: "Going green to be seen" (Griskevicius et al., 2010). The reason is that acting sustainably requires individual costs (heightened expense or changing habits) and at the same time benefits the collective interest (reducing pollution or conserving nature). Accordingly, Griskevicius and colleagues showed in three lab experiments that activating status motives led to increased sustainable behavior. Their participants choose green products over more luxurious non-green products, especially when shopping in public. Hence, people use sustainable behavior as a costly signal, showing their willingness and ability to incur costs for others' benefit, but at the same time increase their own reputation.

The current research conceptually replicates the findings of Griskevicius and colleagues (2010) in a field study. We replicate the findings of the original paper at the construct level, showing that status motives can lead to the public display of sustainable behavior, by using different operationalizations of the independent and dependent variables (Lynch, Bradlow, Huber, & Lehmann, 2015). In the original paper, participants (all students) were assigned to either a control or a status condition, public signaling was operationalized by manipulating either a public or a private setting, and sustainable behavior – the dependent variable – was measured by participants' choice of green versus non-green (luxury) goods. In the current study all participants are shoppers of sustainable grocery stores (are "assigned" to buying green goods), with status motives being inherent to the stores (chain A being a high-status chain and chain

B a lower-status chain), and public signaling of sustainable behavior via the usage of chain-branded bags is measured as the dependent variable.

In line with the findings of Griskevicius and colleagues (2010), we show that people who are shopping at a high-status sustainable grocery chain are more likely to purposely demonstrate their sustainable shopping behavior by using the shopping bags displaying the name of the chain (branded bags), than people shopping at a lower-status sustainable grocery chain. However, extending Griskevicius and colleagues' findings, we show the downside of acting sustainably for status reasons. Specifically, high-status grocery chain shoppers – being particularly concerned about publicly demonstrating their sustainable behavior – buy more branded shopping bags rather than bringing their own reusable bags. This wasteful behavior for purpose of displaying status has obvious negative environmental consequences, such as enhancing pollution, carbon emission, and waste. Hence, within this study we test the paradox of "going green to be seen."

Study

Sustainable grocery chains

In the Netherlands there are two sustainable grocery chains that generally sell the same products at similar prices. In a pre-test (N = 53), both chains were rated on a 5-point Likert scale as equally good for the environment ("Shopping at chain A/B is good for the environment") and as having products of similar quality ("At chain A/B they sell high quality products"), all ps ≥ .408. However, chain A was viewed as attracting more status-oriented shoppers as opposed to chain B. Specifically, participants indicated that shoppers of chain A shop at the sustainable grocery store to display their status more than shoppers of chain B, $F(1, 51) = 10.41$, $p = .002$, part. $\eta^2 = .170$, $M_{\text{ChainA}} = 3.40$ (SD = 0.82) and $M_{\text{ChainB}} = 2.61$ (SD = 0.96). This is evident in the way products are displayed (ostentatious vs. modest), the store's design (trendy vs. moderate), and its atmosphere (formal vs. informal).

Shopping bags

The reusable branded shopping bags (see Picture 3.1) of both chains were pre-tested on their attractiveness, quality, and usefulness. No differences were found between the two bags, all *p*s ≥ .436. In both chains the bags cost 25 euro cents and are located on the cashier desk.

Picture 3.1 *On the left is the original (branded) shopping bag of the more status oriented sustainable grocery store (Store A). On the right is the original (branded) shopping bag of the less status oriented sustainable grocery store (Store B)*

Procedure and sample

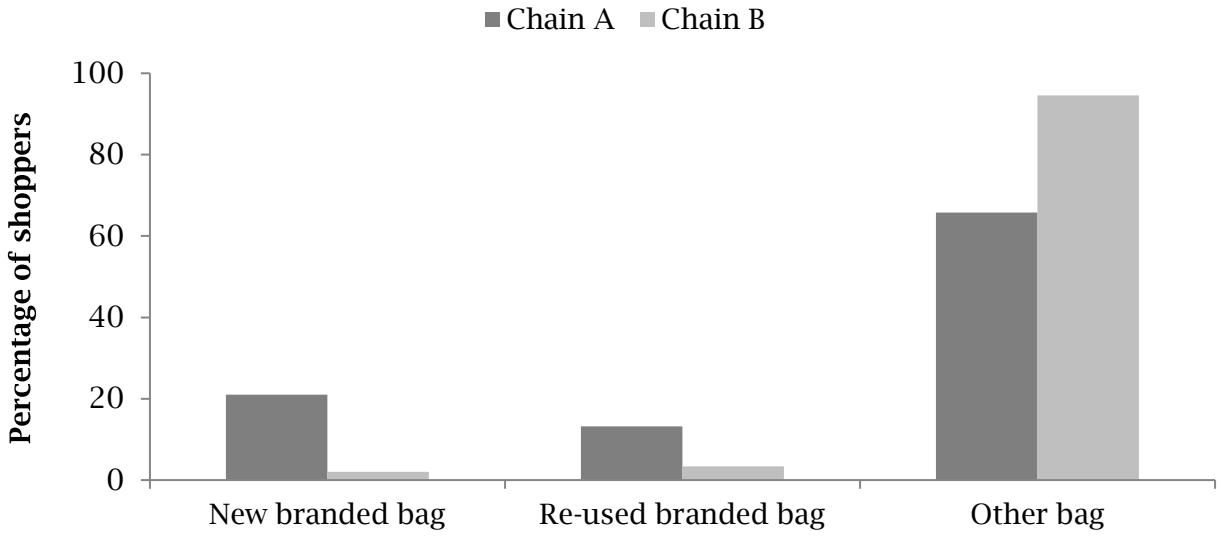
Within four different stores in Amsterdam (two of each chain) we coded shoppers' usage of a branded bag of the sustainable grocery chain. Specifically, the stores of chain A and B were located within walking distance (approximately 350 yards) from one another in a shopper-intensive area in Amsterdam West and Amsterdam Zuid. A trained research assistant (blind to the purpose of the research), standing beside the cashier desk, recorded whether shoppers bought a new branded bag or brought their own bag (either a branded bag or another reusable bag) during eight observational counterbalanced periods across mornings (10:00-12:00am) and afternoons (3:00-

5:00pm). The behavior of all shoppers across the four stores during the observational periods was recorded: 205 in chain A and 205 in chain B (overall $N = 410$).

Results

A comparison of the shoppers across the two chains showed that a higher proportion of the shoppers of chain A, the high-status chain, bought new branded bags from the store during their shopping trip (21.0%) than shoppers of chain B, the lower-status chain (2.0%), $\chi^2(1, N = 410) = 36.55$, $p < .001$, Cramer's $V = .299$. Furthermore, the above finding is complemented by the fact that 13.2% of chain A's shoppers brought a branded bag associated with the chain from home (reused branded bag), whereas only 3.4% of chain B's shoppers brought such a bag, $\chi^2(1, N = 410) = 12.83$, $p < .001$, Cramer's $V = .177$. Other type of bags were brought from home by 65.9% of chain A's shoppers and by 94.6% of chain B's shoppers, $\chi^2(1, N = 410) = 53.56$, $p < .001$, Cramer's $V = .361$. Figure 3.1 depicts the usage of branded bags (new and reused) from the sustainable grocery chains and the usage of other bags.

Figure 3.1 *Differences for shoppers' usage of branded shopping bags (either new or reused) of the sustainable grocery chain and the usage of other bags shoppers brought with them. With chain A being a higher–status sustainable grocery chain than chain B*



Conclusion

The current field study replicated the findings of Griskevicius and colleagues (2010) in a real-world shopping context, showing that status leads people to signal their sustainable behavior. Shoppers shopping at a high-status sustainable grocery chain used more shopping bags displaying the name of the chain than shoppers of a lower-status sustainable chain. In doing so, it demonstrates that the behavior in hypothetical lab situations from the original paper does represent a behavior that exists in "noisy" situations and thereby provides external validity to previous findings and generalize them. Importantly however, the current results add to previous findings by showing the environmental costs of using sustainable behavior as a costly signal. In comparison to shoppers of the lower-status sustainable grocery chain, shoppers of the high-status sustainable grocery chain bought ten times more branded shopping bags, which is in itself a non-sustainable and wasteful act, with obvious detrimental consequences for natural resources and pollution.

As predicted, our findings are in line with evolutionary theory driven research, showing that being altruistic could result in status benefits (Hardy & Van Vugt, 2006). Since using an original shopping bag from the sustainable grocery chain does help to publicly demonstrate sustainable behavior, this is obviously valued more by the high-status sustainable grocery chain shoppers. However, our findings show that although status motives can motivate people to purchase at a sustainable grocery store, this has a downside. Shoppers of the high-status sustainable grocery chain might do it for their own benefit and are not that concerned with the environment, not accounting for the non-sustainable effects of buying new plastic shopping bags.

Managerial implications

To overcome the potential aversive effect identified, it is advisable for sustainable shopping chains to increase – to some extent – the price of the shopping bags so the incentive to purchase a bag is reduced. It is however important to keep the bag's quality-to-attractiveness ratio low enough to prevent the reusable bags from becoming

a luxury product and make them attractive for first time buyers of such bags. Another strategy to reduce the purchase of shopping bags might be to increase shoppers' consciousness of their purchase behavior, by letting them ask the cashiers for the bag. This strategy has been proven to be successful at a regular grocery chain in the Netherlands, reducing 600 kilogram plastic a day (Levensmiddelenkrant, 2012). Moreover, other, more environmental friendly, alternatives for people to publicly display their sustainable shopping could be provided, such as a shoppers web page on which people can post their sustainable purchases. Alternatively, selling only biodegradable shopping bags could already decrease the environmental impact as those bags reduce waste. Encouraging shoppers to bring their own reusable shopping bags from home, through better communication and in-store incentives, seems particularly important, since it has a positive spillover effect on sustainable consumption in general (Karmarkar & Bollinger, 2015).

Limitations and future research directions

Our research suffers from several limitations that leave room for alternative explanations. First, it is possible that shoppers using a bag carrying the label of the high-status chain do so to signal their affiliation with the high-status chain, instead of signaling sustainable behavior. Future research could try to rule out this alternative explanation by means of studying the motivation of shoppers to shop at a sustainable grocery store (environmental reasons, status reasons) and link this to their branded shopping bag usage. Specifically, if shoppers that are motivated by status reasons also buy/reuse more branded shopping bags, then it provides stronger evidence that green high-status shoppers use branded shopping bags to publicly display their sustainable behavior. Another way to test this alternative account with an experimental approach may involve first priming participants with status motives relative to a control condition to be followed by a hypothetical shopping task at a fictitious sustainable grocery store. In the shopping task participants will have to fill a basket with 5 sustainable food products, chosen from a list of 15 sustainable food products that are comparable in price and status. Then they will be asked whether they would prefer using, for their groceries, a branded shopping bag (making the sustainable grocery

shopping visible to the public) or a non-branded shopping bag (similar unbranded bag). This in turn will clarify whether status motives indeed lead to more signaling of the sustainable purchases.

Second, as the study lacks a control group, we cannot rule out whether the effect is driven by the high-status sustainable grocery chain shoppers or the lower-status sustainable grocery chain shoppers. It might be that the latter do their sustainable grocery shopping for environmental reasons and are therefore more inclined to bring their own bags from home. However, it cannot explain why shoppers of the high-status sustainable grocery chain buy sustainable groceries, whereas the benefits of public signaling by means of branded shopping bags usage does. The reason is that displaying sustainable behavior publicly provides status benefits. Moreover, adding a suitable control condition is difficult as a third sustainable grocery chain does not exist in the Netherlands. Adding a regular grocery chain as control condition is neither suitable, since regular grocery chains currently sell both sustainable and non-sustainable products and are thus not comparable.

Third, several shopper characteristics might have influenced the results. Shoppers of the high-status sustainable grocery chain might be wealthier and can easier afford to buy the branded shopping bags than shoppers of the lower-status sustainable grocery chain. This seems however very unlikely, as the branded shopping bags cost only 25 euro cents. Moreover, the high-status nature of chain A might attract more new shoppers who might be more predisposed to buy a shopping bag than regular shoppers. We partially ruled out this explanation by testing our prediction across four different stores, although we have not tested it directly. As in all field studies, it is more difficult to control for such shopper characteristics, but future research in the form of a shopper survey, for example, could provide more insight about shoppers' demographics and purchase of branded reusable bags.

Chapter 4

Temporal myopia in sustainable behavior under uncertainty

Abstract

Consumers in today's world are confronted with the alarming consequences of unsustainable behavior such as pollution and resource degradation. In addition, they are facing increases in uncertainty due to external events such as economic crises and terror attacks. These two problems are central to consumers' lives, occur on a global scale, and have significant impact on the world's political, economic, environmental, and social landscapes. Contributing to research on persuasion and pro-social behavior, we show in four studies, conducted online, in the lab, and in the field, that these two problems are interconnected. Studies 4.1 and 4.2 demonstrate that uncertainty leads to lower levels of sustainable behavior in comparison to certainty. Study 4.2 reveals in addition that this is due to the display of higher levels of temporal discounting under uncertainty (i.e., adopting a more immediate orientation). Finally, Studies 4.3 and 4.4 show that emphasizing the immediate benefits of sustainability during uncertainty reverses the negative effect and leads consumers to act more sustainably. Overall, these findings provide valuable implications for policy makers and responsible marketers.

This chapter is based on Van der Wal, A. J., Van Horen, F., & Grinstein, A. (2018). Temporal myopia in sustainable behavior under uncertainty. *International Journal of Research in Marketing, 35*, 378-393.
https://doi.org/10.1016/j.ijresmar.2018.03.006

Introduction

People today are confronted with several significant societal problems. One prominent problem is the lack of sustainable behavior. Concerns regarding the environment are increasing rapidly with the growing world population, consumption and globalization that threaten nature and resources by degradation, pollution, and climate change (Botkin & Keller, 2010; Gardner & Stern, 2002; Penn, 2003). Encouraging consumers to act sustainably is a difficult task, as environmental issues are often perceived as complex, abstract and insignificant in terms of their direct impact on consumers (Dietz et al., 2003; Spence & Pidgeon, 2010). A second prominent problem consumers are facing today is the increase in uncertainty in their everyday lives. Due to external, societal events like terror attacks, volatile economies, and intensive migration, consumers are confronted with higher levels of unpredictability and change (Arkin, Oleson, & Carroll, 2013). For instance, people do not know where and when terror attacks will take place (Daase & Kessler, 2007), whether their jobs will be secure during economic recessions (Karanikolos et al., 2013), and how immigration will impact society (Esses, Medianu, & Lawson, 2013).

Backed up by anecdotal evidence which shows that an increase in unemployment rates decreases public concern for the environment (Scruggs & Benegal, 2012) and that economic crises result in a deadlock of climate policy (Geels, 2013; Skovgaard, 2014; The World Bank, 2016), there is reason to suspect that these two world problems are interconnected. Specifically, it can be inferred that increased levels of uncertainty negatively impacts sustainable behavior. Contributing to research on persuasion and pro-social behavior, the current research offers a novel attempt to jointly study uncertainty and sustainable behavior. Through four studies conducted online, in the lab, and in the field, this research demonstrates how uncertainty negatively affects consumers' sustainable behavior and how this negative impact can be reversed. In doing so, this research goes beyond anecdotal evidence and offers causal support for the link between uncertainty and sustainability. Furthermore, this research sheds light on the underlying mechanism, demonstrating that the negative influence uncertainty has on sustainable behavior is driven by temporal discounting – the preference for

smaller immediate rewards over bigger future ones (Green & Myerson, 2004; Halevy, 2008). Finally, and importantly, this research shows that emphasizing the immediate benefits of sustainable behavior can be used to effectively lead consumers to act more sustainably under uncertainty. Contrary to earlier research suggesting that the immediate benefits of sustainable behavior need to be emphasized independent of the context (Gardner & Stern, 2002; Leiserowitz, 2005; Li, Johnson, & Zaval, 2011), the current research demonstrates that uncertainty is an important moderator (i.e., emphasizing the immediate benefits of sustainable behavior is a fruitful strategy only under uncertainty, not certainty).

Conceptual development

Uncertainty

In light of the omnipresent and multifaceted role uncertainty plays in human life, as well as in research across multiple domains (e.g., marketing, economics and decision-making), it is not surprising that it has been conceptualized in a variety of different ways (Fox & Ulkümen, 2011; Kahneman & Tversky, 1982; Lipshitz & Strauss, 1997). Among the various forms of uncertainty, Fox and Ulkümen recently distinguished between two key dimensions: aleatory and epistemic uncertainty. Aleatory uncertainty refers to probabilistic variability, which cannot be reduced, and is viewed as random and unpredictable (e.g., whether or not the home team will win a soccer game). Epistemic uncertainty, on the other hand, refers to uncertainty that arises due to a lack of confidence in one's knowledge (e.g., whether or not one has correctly answered a question from the game "Trivial pursuit"). Importantly, Fox and Ulkümen claim that aleatory and epistemic uncertainty are not mutually exclusive. When events involve both forms of uncertainty, such as in unknown probabilities scenarios (e.g., whether a soccer team will win and the chances that a soccer team will win are both unknown), people feel particularly uncertain (Ellsberg, 1961). This is due to a lack of confidence in one's assessment of the probability distribution.

Uncertainty due to external, unpredictable events (e.g., terror attacks, volatile economies and intensive migration) is typically characterized by a combination of aleatory and epistemic uncertainty. Because of the complexity of the events and the absence of reliable estimates regarding their occurrence and outcomes, consumers are not able to make an assessment of the probability that, for instance, a terror attack will hit their city, or whether their job will be lost due to economic crisis or immigration. As such, uncertainty increases depending on the features of the events: volatile and complex events are less predictable in terms of their occurrence and their consequences, and are therefore more likely to induce uncertainty than simpler, more stable events (Milliken, 1987; Van Horen & Mussweiler, 2014). Importantly, such external events can create psychological states of uncertainty only to the extent that the event is relevant to the person's self (Faraji-Rad & Pham, 2016; Van den Bos, 2001). Therefore, in the current research we define uncertainty as the inability to estimate the impact of external, societal events on one's life, and the inability to predict their associated outcomes.

Uncertainty and sustainability

Even though the prevalence of uncertainty in consumers' lives has increased and has become one of the defining challenges of modern times (Arkin et al., 2013), little is known about how feelings of uncertainty affect consumer behavior in a variety of important societal domains, such as sustainability. Here we argue that uncertainty may have an unwelcome effect on the serious global problem of unsustainable behavior. Some indirect or anecdotal evidence already points in that direction. For instance, crises around the economy and immigration have resulted in a rightward shift in the political climate, which often leads sustainability issues to be ignored or disregarded (Mayer, 2013; Neumayer, 2004; Yilmaz, 2012). Moreover, the economic crisis of 2008 has played a major role in holding back climate policy, shifting investment priorities from climate endeavors (for example investment in renewable energy) to the protection of financial systems (Geels, 2013; Skovgaard, 2014; The World Bank, 2016). Additionally, due to an increase in unemployment rates, as a result of the economic recession, the public concern for the environment decreased (Scruggs & Benegal, 2012).

But why would uncertainty lead to unsustainable behavior? One possible reason is that sustainable behavior carries a strong future component, as it requires optimizing environmental, social, and economic consequences to meet future generations' needs (Luchs et al., 2010; Phipps et al., 2013). As such, research has shown that sustainable behavior increases when a future orientation is activated (Van Trijp, 2014). For example, consideration of future consequences positively predicted the likelihood of commuting by public transportation (Joireman, Van Lange, & Van Vugt, 2004). Indeed, a recent meta-analysis has demonstrated that future orientation is a stronger predictor of sustainable behavior for consumers than pro-environmental attitudes (Milfont, Wilson, & Diniz, 2012).

On the other hand, indirect evidence indicates that increased levels of uncertainty lead consumers to focus on immediate, instead of future, outcomes. For instance, during the 2008 economic recession, the purchase of lower priced products, as compared to longer-lasting higher quality products, increased (Kamakura & Du, 2012; Lamey, Deleersnyder, Dekimpe, & Steenkamp, 2007). In addition, threats of terror led to increased materialism and greediness. For example, after 9/11, people spent more money on pleasurable items such as clothing and entertainment, and wanted to profit more than others from collective resources in a forest management game, leading them to overconsume these resources (Kasser & Sheldon, 2000).

One theoretical paradigm that may explain why consumers become more focused on immediate benefits under uncertainty, and could thereby help to clarify why uncertainty leads to a decrease in sustainable behavior, is life history theory. Life history theory states that consumers adopt a life strategy that varies on a continuum from being focused on future outcomes (slow life strategy) to being focused on immediate outcomes (fast life strategy; Kaplan & Gangestad, 2005). The decision to prefer one strategy to the other depends mainly on the harshness and predictability of the environment in which consumers live and the certainty they have regarding their future (Nettle, 2010). According to the theory, it is beneficial to follow slower life strategies when the environment is certain in order to ensure future outcomes, as it enhances future survival. On the contrary, in an uncertain environment it is more beneficial to adopt faster life strategies to ensure some immediate outcomes (i.e.,

immediate survival), as it is unknown what the future holds (Chisholm et al., 1993; Ellis et al., 2009; Griskevicius et al., 2013). In other words, people's instinctive behavioral response is to display higher levels of temporal discounting – i.e., opting for smaller immediate rewards over bigger future ones (Green & Myerson, 2004; Halevy, 2008) – while coping with uncertainty.

Building on fast life history, we propose that consumers are more likely to display higher levels of temporal discounting to ensure immediate benefits when they experience uncertainty. Such a tendency is contradictory to sustainable behavior, which is inherently associated with a future orientation (Luchs et al., 2010; Phipps et al., 2013). Hence, there seems to be a mismatch between uncertainty and sustainable behavior, leading to the prediction that uncertainty would negatively affect sustainable behavior. Specifically, in order to establish whether this negative effect is due to the conflicting temporal focus (i.e., sustainable behavior needs a future oriented focus, while people tend to focus on immediate benefits when facing uncertainty) we test the mediating role of temporal discounting. Hence, we expect that uncertainty increases temporal discounting, which in turn negatively affects sustainable behavior. Overall, we formally propose that:

H1: Consumers display lower levels of sustainable behavior during uncertainty as opposed to certainty.

H2: Temporal discounting mediates the negative effect of uncertainty on sustainable behavior.

Reversing the negative impact of uncertainty on sustainability

In a world in which uncertainty is highly prevalent (Arkin et al., 2013) and the promotion of sustainable behavior is crucial, it is necessary to find ways to overcome the mismatch between uncertainty (which fosters higher levels of temporal discounting) and sustainability (which requires lower levels of temporal discounting). Here, we propose that emphasizing the immediate benefits of sustainable behavior (e.g., sustainable seafood supports the current survival of marine life), as compared to the future benefits (e.g., sustainable seafood supports the future survival of marine

life) could be a simple, but highly effective strategy to increase consumers' sustainable behavior under uncertainty, as it fits with people's heightened temporal discounting levels when facing uncertainty.

Under certainty, however, predictions are less straightforward as previous research demonstrates mixed views. One line of work suggests that immediate benefits, and not future benefits, should be emphasized in order to enhance sustainable behavior (Gardner & Stern, 2002; Leiserowitz, 2005; Li et al., 2011). For instance, Li and colleagues showed that when people were made aware that the current day temperature was warmer than usual, it increased people's sustainable attitudes and behavior. In addition, Gardner and Stern showed that sustainable marketing strategies that highlight the consequences of wasteful behavior on future generations have found to be ineffective. However, a different line of work based on life history theory suggests that in certain environments survival chances can be increased by focusing on future benefits as it is then beneficial to adopt slower life strategies (Chisholm et al., 1993; Ellis et al., 2009; Griskevicius et al., 2013). Hence, for certainty, the effect of emphasizing immediate or future benefits on sustainable behavior is unclear. Overall we therefore develop a formal hypothesis only for the uncertainty condition:

H3: Emphasizing immediate benefits of sustainability as opposed to future benefits increases sustainable behavior under uncertainty.

Current research

To test the hypotheses and generalizability of our findings, four experimental studies were conducted, online, in the lab, and in the field. Study 4.1 (lab experiment) tested whether uncertainty leads to lower levels of intentions to behave sustainably (measured by willingness to pay for sustainable products) as compared to certainty (H1). Study 4.2 (online experiment) showed the robustness of the effect by replicating the main negative effect of uncertainty on sustainable attitude and product choice, also testing the underlying mechanism of temporal discounting (H2). Study 4.3 (lab experiment) and Study 4.4 (field study) investigated whether emphasizing immediate

benefits of sustainability could be used as a strategy to reverse the negative effect of uncertainty on sustainable behavior, by measuring attitudes and actual donation behavior (H3). As a critical test of the strategy, the field study was conducted at the central train station in Brussels two weeks after the terror attacks on Brussels' international airport and subway system on March 22, 2016, utilizing the high levels of uncertainty in the days following the tragic event.

The predictions were tested across a variety of sustainability measures (actual donation behavior, sustainable attitudes, and willingness to pay for sustainable products), empirical settings (lab, online, and field), and manipulations of uncertainty (e.g., feelings of uncertainty elicited through personally recalled events, economic crises, and terror attacks) to demonstrate the generalizability and robustness of the results.

Study 4.1: Uncertainty and sustainability

Study 4.1 tests H1, that uncertainty leads to lower levels of sustainable consumer behavior, in a controlled experimental setting. In order to rule out any general negative effect of uncertainty on consumer behavior, such as decreased consumption of all types of products, we measure willingness to pay for both sustainable products and conventional products.

Method

Participants and design. Eighty students from a Dutch university (M_{age} = 21.59, *SD* = 3.02; 61.3% female) took part in the 2 (condition: uncertain vs. certain) x 2 (type of product: sustainable vs. conventional) between-subjects experiment for a small monetary reward.

Uncertainty manipulation. Uncertainty was manipulated by a reading and writing task. Specifically, participants read the following paragraph: "Uncertainty (Certainty) is highly prevalent in our lives, since nothing (almost everything) in the

world is stable. The future is affected by coincidental (expectable) world events that cannot (can) be foreseen and the behavioral outcomes of our actions are unknown (more or less known) to us. We cannot (can) make predictions about how world events will affect our lives, because everything (nothing) in life really changes." Afterwards, participants were asked to write about a situation that happened in their lives that was either uncertain or certain.

A pretest was conducted to test whether the uncertainty paragraph indeed activated more uncertainty than the certainty paragraph. Additionally, as the paragraphs used words such as "future" and "foreseen", the pretest examined whether the conditions differed in temporal orientation. This would rule out the alternative explanation that sustainable behavior is decreased under uncertainty, because of the higher future orientation in the uncertainty condition. Thirty M-Turk participants (M_{age} = 33.40, *SD* = 9.19; 43.3% female) read the paragraphs (in random order) and indicated whether the text focused more on uncertainty or certainty on a 7-point Likert scale ranging from 1 (*uncertainty*) to 7 (*certainty*), and whether the text was more present- or future-oriented on a 7-point Likert scale ranging from 1 (*present*) to 7 (*future*). The results revealed that the manipulation of uncertainty was successful, $F(1, 29) = 60.51$, $p < .001$, part. $\eta^2 = .68$. Participants indicated that the world was described as more uncertain in the uncertainty condition ($M = 2.20$, $SD = 2.02$) than in the certainty condition ($M = 6.10$, $SD = 1.58$). Furthermore, and as intended, the uncertainty ($M = 6.10$, $SD = 1.32$) and certainty conditions ($M = 6.10$, $SD = 1.24$) did not differ in their temporal orientation, $F(1, 29) < 0.01$, $p = 1.00$.

Products. Three products were selected for the study, which are commonly used by students: jeans, candles, and copy paper. They represented a mix of both utilitarian and hedonic products and differed in pricing. The same product was either accompanied with a sustainability logo (i.e., sustainable product) or without a sustainability logo (i.e., conventional product; see Picture 4.1).

Picture 4.1 *Product manipulation with the sustainable products (above) and the conventional products (below)*

Procedure and measures. After giving their informed consent, participants were randomly assigned to either the uncertainty or certainty condition, in which they had to read a paragraph about (un)certainty and subsequently had to describe in detail a (un)certain situation that had happened in their lives. To measure sustainable behavioral intentions, participants were then asked to indicate their willingness to pay for all three products (jeans, candles, copy paper) on a slider scale. For the jeans, the scale ranged from 45 to 80 euros in seven increments of 5 euros (the average price Dutch consumers pay for jeans is 75 euros; Van Rossum, 2012). For the candles, the scale ranged from 2.15 to 4.95 euros in seven increments of 40 cents (the typical market price for such candles is 4.95 euros[6]). For the copy paper, the scale ranged from 3.35 to 7.55 euros in seven increments of 60 cents (the typical market price for this copy paper is 7.25 euros[7]). Because students have generally low budgets and are less

willing to pay a high price for these products, the typical market prices were at the high end of the price range to increase variation. Still the majority of participants were only willing to pay the lowest price for all three products. In the sustainable product condition, participants indicated their willingness to pay for the three products with a sustainability logo, whereas in the conventional product condition, participants indicated their willingness to pay for the same three products without a sustainability logo. This was followed by a manipulation check where participants were asked to indicate the extent in which the world was described as certain/predictable on a 7-point Likert scale from 1 (*very uncertain/unpredictable*) to 7 (*very certain/predictable*). To control for mood, participants were asked to indicate how the situation they described made them feel ranging from 1 (*very bad*) to 7 (*very good*). Finally, participants were asked to answer some demographic questions and were thanked for their participation.

Results

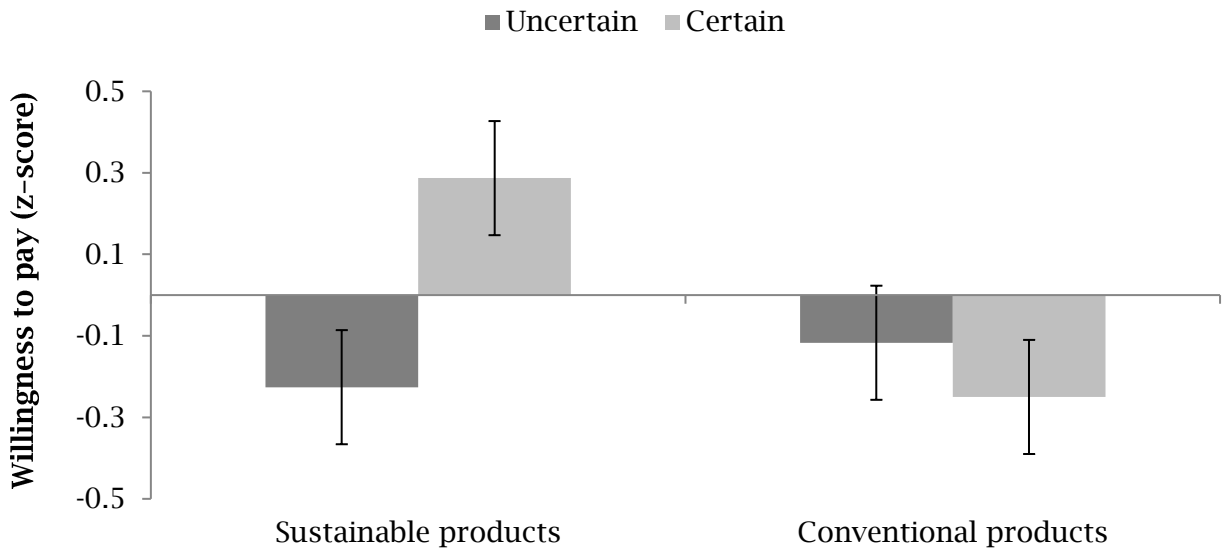
Manipulation check. The results from the MANOVA revealed that the manipulation was successful. In the uncertainty condition participants indicated that the situation they described was more uncertain ($M = 1.78$, $SD = 1.05$), $F(1, 78) = 265.95$, $p < .001$, part. $\eta^2 = .77$, and more unpredictable ($M = 1.90$, $SD = 1.48$), $F(1, 78) = 83.48$, $p < .001$, part. $\eta^2 = .52$, in comparison to participants in the certainty condition (respectively, $M = 6.02$, $SD = 1.27$ and $M = 5.45$, $SD = 1.96$).

Willingness to pay. As the products differed in price range, the willingness to pay items for the three different products were combined by means of averaging their z-scores. The results from the ANOVA revealed that there was no main effect of condition ($F(1, 76) = 1.86$, $p = .18$, part. $\eta^2 = .02$) or type of product ($F(1, 76) = 2.35$, $p = .13$, part. $\eta^2 = .03$) on willingness to pay. As predicted, the analysis revealed an interaction between condition and type of product, $F(1, 76) = 5.33$, $p = .02$, part. $\eta^2 = .07$. Figure 4.1 shows the interaction effect of (un)certainty and product type on willingness to pay.

Simple effect tests revealed that participants in the uncertainty condition ($M = -0.23$, $SD = 0.61$) were less willing to pay for sustainable products than participants in

the certainty condition (M= 0.29, SD = 0.80), F(1, 76) = 6.74, p = .01, part. η^2 = .08. No difference between conditions was found for the willingness to pay for the conventional products ($M_{Uncertain}$ = -0.12, SD = 0.51; $M_{Certain}$ = -0.25, SD = 0.54), F(1, 76) = 0.45, p = .51, part. η^2 = .01. Moreover, participants in the uncertainty condition were willing to pay the same price for the sustainable products and the conventional products, F(1, 76) = 0.30, p = .59, part. η^2 = .004, whereas participants in the certainty condition were willing to pay more for the sustainable products (M= 0.29, SD = 0.80) than for the conventional products (M = -0.25, SD = 0.54), F(1, 76) = 7.38, p = .01, part. η^2 = .09.

Figure 4.1 *Influence of condition (uncertain vs. certain) and product type (sustainable vs. conventional) on willingness to pay*



Note. Error bars indicate +/- one standard error of the mean.

Mood. The results from the ANOVA revealed that condition affected mood, F(1, 78) = 35.41, p < .001, part. η^2 = .31. Participants in the certainty condition displayed a more positive mood (M = 4.83, SD = 1.34) as opposed to participants in the uncertainty condition (M = 3.25, SD = 1.01). When mood was included as a covariate, results revealed no main effect of mood on willingness to pay, F(1, 75) = 1.63, p = .21, part. η^2

= .02, and, importantly, the predicted interaction between condition and the products' sustainability remained significant, $F(1, 75) = 5.31$, $p = .02$, part. $\eta^2 = .07$.

Discussion

Study 4.1 shows that when consumers feel uncertain they are less willing to pay for sustainable products as compared to when they feel certain. Moreover, uncertain consumers are not willing to pay more for sustainable products as compared to conventional products, even though sustainable products are more expensive than conventional ones (Deleersnyder, Dekimpe, Sarvary, & Parker, 2004). Hence, these results provide evidence that uncertainty indeed decreases consumers' intention to behave sustainably (H1).

Study 4.2 Mediating role of temporal discounting

Study 4.1 showed that consumers are less willing to pay for sustainable products when feeling uncertain in comparison to feeling certain. Study 4.2 contributes to the first study in two ways: first, it investigates the mediating role of temporal discounting. More specifically, we predict that when primed with uncertainty, as compared to certainty, participants display higher levels of temporal discounting (i.e., opting for immediate benefits), which in turn leads to a decrease in sustainable product preferences (H2). Second, the study aims to replicate the former results by using a different uncertainty manipulation (economic crisis), different products (luxurious vs. sustainable), and different measurements of sustainable behavioral intentions (sustainable attitude and sustainable product choice) in order to demonstrate the robustness of the findings. Particularly, the luxurious products were used to test whether the results still hold after increasing the attractiveness of the conventional product – offering a conservative test of our theory.

Method

Participants and design. A sample of 213 Dutch participants (M_{age} = 25.71, *SD* = 10.00; 58.7% female) was recruited via email using snowball sampling and participated voluntarily in a two group (condition: uncertain vs. certain) between-subjects design.

Uncertainty manipulation. In the uncertainty condition, participants read the introduction "Signs that the economy is getting worse" and then viewed six images depicting consequences of an economic crisis, such as signs of foreclosure and raising unemployment rates. In the certainty condition, participants read the introduction "A day at home: Organizing your desk" and then viewed six images depicting objects found in an office (adapted from Hill, Rodeheffer, Griskevicius, Durante, & White, 2012).

Products: luxurious vs. sustainable. Three products were selected: a dishwasher, a backpack, and a lamp (adapted from Griskevicius et al., 2010). For each of the three products, a luxurious and sustainable version was created by providing three key features of the product that were either luxurious or sustainable. All other features (e.g., price and brand) were equal across the products.

Procedure and measures. After giving their informed consent, participants were randomly assigned to either the uncertainty or the certainty condition in which they were either asked to view pictures of the economic crisis or of office supplies. Then, sustainable attitudes were measured by asking participants to indicate how attractive they thought the luxurious versus sustainable option was for each of the three product pairs on a Likert scale ranging from 1 (*definitely product A* [e.g., luxurious dishwasher]) to 9 (*definitely product B* [e.g., sustainable dishwasher]). The attractiveness ratings of the three products were averaged (backpack reversed coded), with higher scores indicating a higher attractiveness of the sustainable option and lower scores indicating a higher attractiveness of the luxurious option. Participants were then asked to indicate for each of the three products (dishwasher, backpack, or lamp), whether they would buy the luxurious or sustainable option. After they had completed the attitude and choice measure, participants completed an intertemporal choice task to measure temporal discounting (see Wilson & Daly, 2004). They were asked to make seven binary

intertemporal choices between two monetary options. For example, they were asked to make a choice between getting 100 euros now (immediate reward) or a larger sum after 90 days (future reward). The larger future reward started with 110 euros in the first intertemporal choice participants had to make and increased with 10 euros increments each time, ending with 170 euros in the seventh intertemporal choice. The number of times that participants chose the immediate reward was scored, where higher scores indicate higher temporal discounting (i.e., more present oriented) and lower scores indicate lower temporal discounting (i.e., more future oriented). Following the temporal discounting task, participants were asked, as a manipulation check, to indicate whether the scenarios depicted on the pictures were 1 (*uncertain*) to 5 (*certain*). This was followed by the same mood question used in Study 4.1. Finally, participants answered some demographic questions and were thanked for their participation.

Results

Manipulation check. The results from the ANOVA revealed that the manipulation was successful. In the uncertainty condition, participants indicated that the pictures depicted a less certain scenario (M = 2.00, SD = 1.29) in comparison to participants in the certainty condition (M = 3.02, SD = 1.53), $F(1, 211) = 27.60$, $p < .001$, part. $\eta^2 = .12$.

Sustainable attitude. The results from the ANOVA revealed, as predicted, that participants in the uncertainty condition displayed a more negative attitude towards the sustainable products (M = 4.70, SD = 2.05) than participants in the certainty condition (M = 5.42, SD = 2.12), $F(1, 211) = 6.41$, $p = .01$, part. $\eta^2 = .03$.

Sustainable product choice. Because participants had to choose between the luxurious and the sustainable option for each of the three products (dishwasher, backpack, and lamp), the data was restructured and a logistic random intercept regression, with condition and product as fixed effects and participant as random effect (to correct for the dependence of choice within each participant) was conducted. Results showed a marginal significant effect of condition on sustainable product choice, $z = -1.83$, $p = .07$. Participants in the uncertainty condition preferred to buy the

sustainable product less (48.1%) than participants in the certainty condition (56.0%). This seems to indicate that uncertainty reduces intentions to behave sustainably.

Mediating effect of temporal discounting. To examine whether temporal discounting mediates the effect of uncertainty on sustainable attitude and product choice, the PROCESS macro bootstrapping procedure (10,000 bootstraps, Model 4; Preacher, Rucker, & Hayes, 2007, with certainty coded as 0 and uncertainty as 1) was employed. Results revealed that level of uncertainty positively affected temporal discounting, $b = 0.68$, $t = 2.45$, $p = .02$. After the inclusion of temporal discounting into the full model, results showed that temporal discounting negatively affected participants' sustainable attitude, $b = -0.15$, $t = -2.16$, $p = .03$, as well as sustainable product choice, $b = -0.06$, $t = -1.90$, $p = .06$, whereas the effect of uncertainty on sustainable product choice reduced to insignificance, $b = -0.19$, $t = -1.44$, $p = .15$, the effect remained significant for sustainable attitude, $b = -0.62$, $t = -2.16$, $p = .03$. The 95% bootstrapped confidence intervals for the indirect effect of uncertainty on sustainable attitude ($b = -0.10$, 95% CI = -0.26 to -0.02) as well as sustainable product choice ($b = -0.04$, 95% CI = -0.11 to -0.01) did not include zero, indicating that temporal discounting mediates the effect. Importantly, level of uncertainty and temporal discounting did not show a high correlation ($r = .17$), indicating that the two constructs are distinctive.

Mood. The results from the ANOVA revealed that condition affected mood, $F(1, 211) = 99.78$, $p < .001$, part. $\eta^2 = .32$. Similar to Study 4.1, participants in the certainty condition displayed a more positive mood ($M = 3.78$, $SD = 0.91$) as opposed to participants in the uncertainty condition ($M = 2.43$, $SD = 1.06$). When mood was included as a covariate, results revealed no main effect of mood on sustainable attitudes, $F(1, 210) = 0.74$, $p = .39$, part. $\eta^2 = .004$, or on sustainable product choice, $z = -0.71$, $p = .48$. More importantly, the predicted main effect of condition on sustainable attitudes remained significant, $F(1, 210) = 6.61$, $p = .01$, part. $\eta^2 = .03$, and the effect on sustainable product choice remained marginally significant, $z = -1.90$, $p = .06$. In addition, the mediating effect of temporal discounting remained after including mood as a covariate for sustainable attitudes ($b = -0.13$, 95% CI = -0.33 to -0.02) and for sustainable product choice ($b = -0.05$, 95% CI = -0.14 to -0.01).

Discussion

Consistent with the results of Study 4.1, Study 4.2 shows that sustainable attitude and sustainable product choice decrease when consumers face uncertainty. Moreover, the findings show that this negative effect of uncertainty on sustainable behavioral intentions is due to consumers' orientation towards immediate benefits (i.e., display higher temporal discounting levels) during uncertainty. This latter finding supports H2, demonstrating that temporal discounting mediates the negative effect of uncertainty on sustainable behavior.

Study 4.3: Increasing sustainable behavior under uncertainty

Study 4.2 showed that consumers display higher levels of temporal discounting (i.e., become more present oriented) when experiencing uncertainty, which leads them to like sustainable products less. If consumers are more focused on the here-and-now under uncertainty, we hypothesize that highlighting the immediate benefits of a sustainable product could be a useful strategy to enhance sustainable behavior during uncertainty. Study 4.3 tests this hypothesis, and in doing so hopes to offer valuable insights for policy makers and responsible marketers. This is important, especially because sustainability campaigns often use the opposite strategy: emphasizing future problems or benefits, for instance by using slogans such as "no fish, no future" or "to care for the planet is to care for the future" (e.g., Greenpeace, 2017). However, such appeals that emphasize the future consequences of non-sustainable behavior are often ineffective (Gardner & Stern, 2002). Therefore, Study 4.3 tests whether emphasizing the immediate benefits of sustainable behavior lead consumers to act more sustainably (H3).

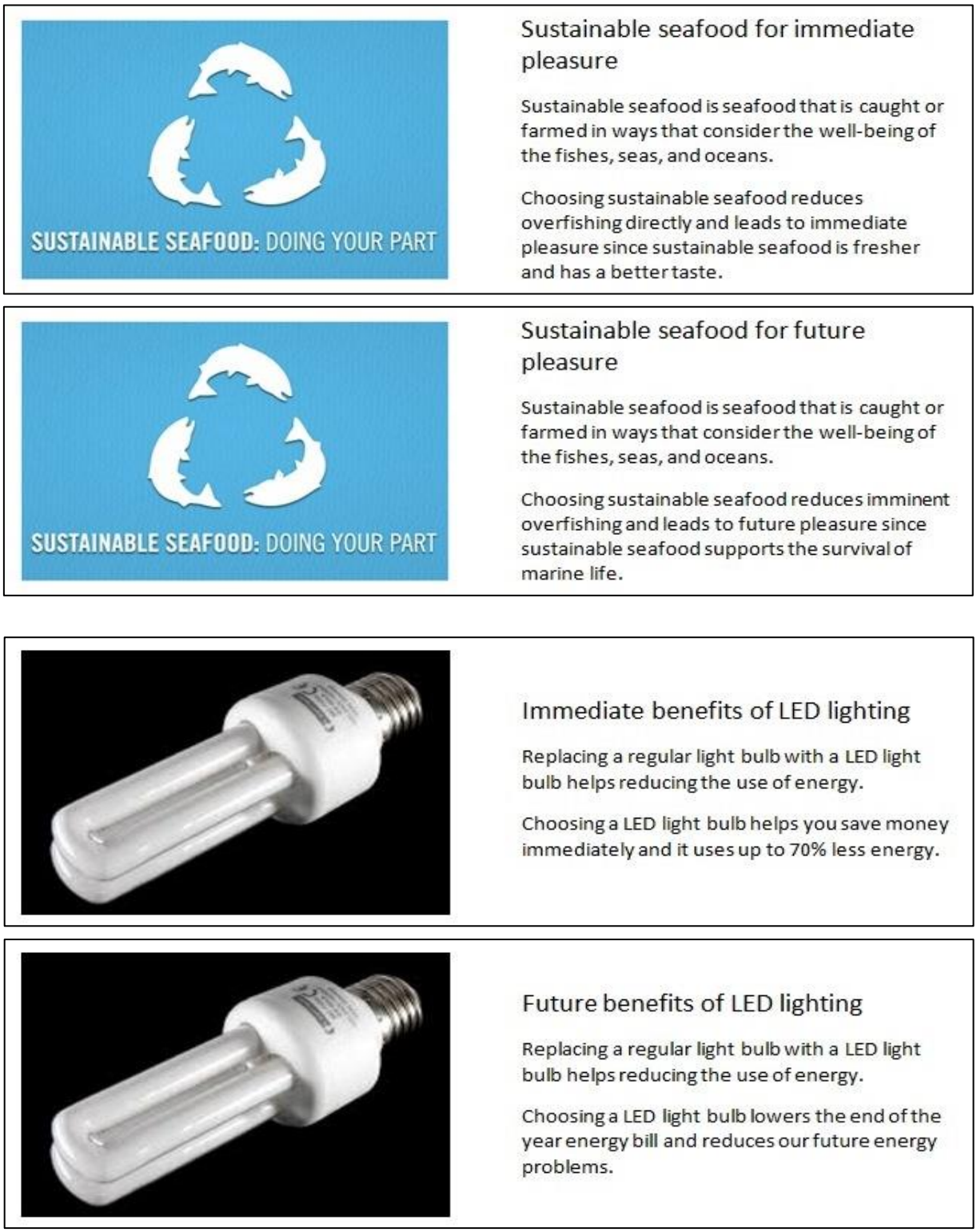
Method

Participants and design. One hundred and sixty five students from a Dutch university (M_{age} = 22.06, SD = 1.93; 44.8% female) took part in a 2 (condition: uncertain vs. certain) x 2 (message frame: immediate vs. future) between-subjects design for class credit.

Manipulation of message frame. In order to manipulate the temporal benefits of sustainable products, advertisements were created for two products (sustainable seafood and a LED bulb) which highlighted either the immediate or the future benefits of the sustainable product. The advertisement emphasizing the immediate (future) benefits of sustainable seafood read: "Choosing sustainable seafood currently reduces overfishing (imminent overfishing) and leads to immediate (future) pleasure since sustainable seafood is fresher and has a better taste (supports the survival of marine life)." The advertisement emphasizing the immediate (future) benefits of a LED bulb read: "Choosing a LED light bulb helps you save money immediately (lowers the end of the year energy bill) and it uses up to 70% less energy (reduces our future energy problems)." See Picture 4.2 on the next page for the specific advertisements.

A pretest was conducted to examine whether our manipulation was successful. Within this pretest, sixty-three students (M_{age} = 20.54, SD = 1.58; 49.2% female) were randomly assigned to view the sustainable products that either highlighted the immediate benefits or the future benefits. For each product (sustainable seafood and LED bulb), participants were asked to indicate whether the product provided more immediate or future benefits on a 7-point Likert scale ranging from 1 (*immediate benefits*) to 7 (*future benefits*). Moreover, to ensure that the advertisement did not differ on other relevant aspects, participants were also asked to indicate the valence (1 = *negative*, 7 = *positive*), complexity (1 = *not complex*, 7 = *very complex*), and certainty (1 = *uncertain*, 7 = *certain*) of the products on 7-point Likert scales. Results showed that the advertisements emphasizing the immediate benefits of sustainable products were, as intended, perceived as focusing more on the immediate benefits ($M_{Seafood}$ = 5.06, SD = 1.67 and M_{Lamp} = 3.31, SD = 1.96) than the advertisements emphasizing the future benefits of sustainable products ($M_{Seafood}$ = 5.94, SD = 0.88 and M_{Lamp} = 5.77, SD = 1.28), $F(1, 61) = 6.79$, $p = .01$, part. $\eta^2 = .10$, $F(1, 61) = 34.59$, $p < .001$, part. $\eta^2 = .36$, respectively. Furthermore, the advertisements of both products did not differ in valence, complexity, and certainty (all ps > .24). Especially the finding that both the immediate and future benefits message frames did not differ in certainty is important, as some scholars argue that immediate benefits are inherently more certain and future benefits more uncertain (Halevy, 2008), which could alternatively explain the effect.

Picture 4.2 *Product manipulation with on the top the immediate benefits framing and on the bottom the future benefits framing for sustainable seafood and led lightning*



Procedure and measures. After giving their informed consent, participants were randomly assigned to either the uncertainty or certainty condition, using the same picture viewing task as in Study 4.2. After the manipulation, participants were asked to indicate their attitudes towards the two sustainable products (seafood and lamp) on a scale ranging from 1 (*not at all attractive*) to 7 (*very attractive*). Then, as a manipulation check, participants were asked to indicate whether the picture primes they viewed were 1 (*uncertain*) to 5 (*certain*; see Study 4.2). This was followed by the same mood question as used in Studies 4.1 and 4.2. Finally, participants answered some demographic questions, including their level of proficiency in English (1 = *very bad*, 2 = *bad*, 3 = *poor*, 4 = *average*, 5 = *fair*, 6 = *good*, 7 = *very good*), as the understanding of the description accompanying the sustainable products was of particular importance, and were thanked for their participation.

Results

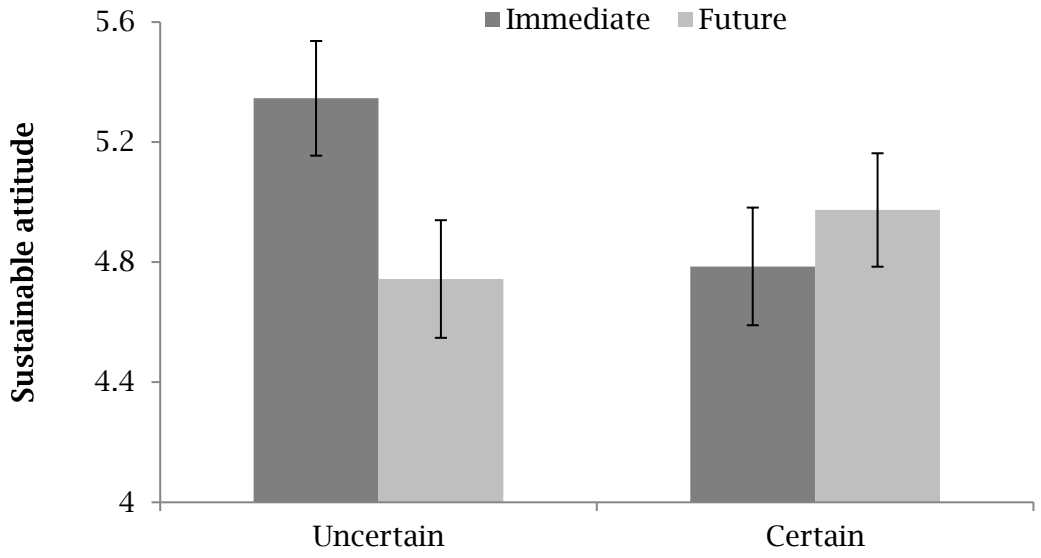
Manipulation check. The results from the ANOVA revealed that the manipulation was successful. Within the uncertainty condition participants indicated that the pictures depicted a less certain scenario ($M = 3.04$, $SD = 1.40$) in comparison to participants in the certainty condition ($M = 4.24$, $SD = 0.79$), $F(1, 163) = 46.26$, $p < .001$, part. $\eta^2 = .22$.

Sustainable attitudes. The results from the ANOVA revealed no main effect of condition ($F(1, 157) = 0.73$, $p = .39$, part. $\eta^2 = .01$) or of message frame ($F(1, 157) = 1.15$, $p = .29$, part. $\eta^2 = .01$) on sustainable attitudes. As predicted, the analysis revealed a significant interaction between condition and message frame, $F(1, 157) = 4.21$, $p = .04$, part. $\eta^2 = .03$.[8] Figure 4.2 on the next page shows the interaction effect between (un)certainty and message framing on sustainable attitude.

Mood. The results from the ANOVA revealed that condition affected mood, $F(1, 163) = 138.13$, $p < .001$, part. $\eta^2 = .46$. Similar to the previous studies, participants in the certainty condition displayed a more positive mood ($M = 3.49$, $SD = 0.79$) than participants in the uncertainty condition ($M = 2.23$, $SD = 0.57$). When mood was included as a covariate, results revealed a main effect of mood on perceived attractiveness of the sustainable products, $F(1, 156) = 6.29$, $p = .01$, part. $\eta^2 = .04$.

Importantly, the predicted interaction between condition and the message frame remained significant, $F(1, 156) = 4.75$, $p = .03$, part. $\eta^2 = .03$. Again, simple effect tests showed that in the uncertainty condition the sustainable products were rated as more attractive when they were accompanied with an immediate benefits message frame than with a future benefits message frame, $F(1, 156) = 4.19$, $p = .04$, part. $\eta^2 = .03$ ($M_{Immediate} = 5.09$, $SE = 0.22$ and $M_{Future} = 4.54$, $SE = 0.21$), whereas no difference in attractiveness rating between frames was found in the certainty condition, $F(1, 156) = 1.04$, $p = .31$.

Figure 4.2 *Influence of condition (uncertain vs. certain) and message frame (immediate vs. future) on sustainable attitude*



Note: Error bars indicate +/- one standard error of the mean.

Reconciling the results of Study 4.3 with Studies 4.1 and 4.2, after controlling for mood, participants rated the future benefits message frame as less attractive in the uncertainty condition than in the certainty condition, $F(1, 156) = 4.66$, $p = .03$, part. $\eta^2 = .03$ ($M_{Uncertain} = 4.54$, $SE = 0.21$ and $M_{Certain} = 5.25$, $SE = 0.22$), whereas no difference was found between conditions for the immediate benefits message frame, $F(1, 156) = 0.12$, $p = .73$. This indicates, as was predicted, that the negative main effect of uncertainty

on sustainability is most likely due to the default perception that sustainable products provide future benefits, and that these future benefits are less valued by people in the uncertainty condition. The unexpected finding – when not controlled for mood – that sustainable attitudes were the highest in the uncertainty condition (even more than the certainty condition) when the sustainable products were advertised with an immediate message frame, could be explained by the heightened negative mood in the uncertainty condition. Research has shown that people want to restore their negative mood with immediate benefits (Tice, Baumeister, & Zhang, 2004). In other words, the negative mood of participants in the uncertainty condition probably causes the heightened attractiveness of the sustainable product accompanied with an immediate benefits message frame, hence, the high sustainable attitude.

Discussion

In sum, the results of Study 4.3, while controlling for mood, show that the attitude towards sustainable products is lowest in the uncertainty condition when the sustainable products were advertised with a future benefits message frame. Moreover, highlighting immediate benefits buffers the negative effect of uncertainty on sustainability, bringing rated attractiveness back to the level of responses in the certainty condition. This indicates that a communication strategy emphasizing the immediate benefits of sustainability can enhance sustainable attitudes during uncertain times, supporting H3. Conversely, participants were not influenced by the message frames when facing certainty.

Study 4.4: Field study

Study 4.3 provided the first evidence for the idea that emphasizing immediate benefits can enhance sustainable attitudes under uncertainty. Study 4.4 builds on this study in two important ways: first, instead of a lab setting, this study was conducted in a natural setting at the central train station in Brussels two weeks after the terror attack on the airport and subway system on March 22, 2016. A key reason for choosing this research

setting was the high level of uncertainty people naturally faced following the attack. Second, instead of sustainable attitudes and behavioral intentions, Study 4.4 tests actual sustainable behavior (i.e., donation amount to the non-profit organization WWF, which is, besides the protection of animals, dedicated to the preservation of nature).

Method

Participants and design. Two hundred and sixty consumers were approached at the Brussels train station and asked to make a donation to the environmental non-profit organization WWF. The study was set up as a two group (message frame: immediate vs. future) between-subjects design. In total, 128 consumers were approached with an immediate message frame (i.e., highlighting the immediate benefits of donating) and 132 consumers were approached with a future message frame (i.e., highlighting the future benefits of donating).

Manipulation of the message frame. A standardized verbal script was used to approach consumers and ask them to donate, emphasizing either the immediate or future benefits of the donation. The script was: "Alongside the protection of animals, WWF is already fighting for many years against air pollution in major European cities like Brussels, because the pollution has a very negative effect on the environment and the current (future) health of your lungs. If you care about the environment and thus the current (future) preservation of clean air and lungs, please support us with your donation." An actual donation box of WWF was used to collect the donations. On each side of the donation box a slogan corresponding the verbal script was printed: "Care about your current (future) health!"

Procedure and measures. Two weeks after the terror attacks at Brussels airport and subway system on March 22, 2016, two research assistants went to Brussels' central station to collect donations for the non-profit environmental organization WWF. The research assistants were blind to the hypotheses and collected donations for four hours, each on a different day. On Monday April 4, 2016, the research assistant began with the future condition from 10:00-11:00am, followed by the immediate condition for two hours (with a lunch in between for the assistant), and the fourth hour from

1:30-2:30pm was dedicated to the future condition again. On Thursday April 7, 2016, the order was reversed. The research assistants approached consumers with a WWF box and asked for a donation, either emphasizing the immediate or the future benefits of the donation. The number of consumers who did not donate (N = 193; $N_{Immediate}$ = 90, N_{Future} = 103) was reported on a form. Consumers who did donate (N = 67; $N_{Immediate}$ = 38, N_{Future} = 29) were asked to answer four additional questions: three demographic questions (age, gender, and nationality) and a final question to validate our assumption that a terror attack makes consumers perceive the world as more uncertain: "I think the world in which we live is unpredictable and uncertain" on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The amount of every donation was reported on the back of the survey. Some consumers did not answer the four survey questions (N = 14; $N_{Immediate}$ = 8, N_{Future} = 6).

Results

Perceived uncertainty. The analysis of perceived uncertainty revealed that participants found the world in which they live more unpredictable and uncertain (M = 4.60, SD = 1.28) than the neutral point (4 on a 7-point Likert scale), $t(52) = 3.44$, $p = .001$. This means that consumers did perceive the world as uncertain two weeks after the terror attack.

WWF donation. A multinomial logistic regression revealed that a higher proportion of consumers who were told about the donation's immediate benefits made a donation to WWF (29.7%) than consumers who were told about the donation's future benefits (22.0%), but this effect was only directional, $\chi^2(1, N = 260) = 2.03$, $p = .15$, Nagelkerke $R^2 = .01$. However, for those who donated, an ANOVA revealed that consumers who were told about the immediate benefits of donating, donated more money (in euros) on average to WWF (M = 1.74, SD = 1.09) than consumers who were told about the future benefits (M = 1.26, SD = 0.90), $F(1, 65) = 5.43$, $p = .02$, part. $\eta^2 = .08$.

Discussion

The findings of Study 4.4 replicate those of Study 4.3 in a natural setting. Moreover, it measures actual donation behavior to an environmental non-profit organization and provides ecological validity to our earlier results. The findings consistently show that emphasizing the immediate benefits of supporting a sustainable organization, as opposed to the future benefits, is a successful strategy to promote sustainable behavior under uncertainty. Additionally, whereas Study 4.1 elicited uncertainty through personally recalled events and Studies 4.2 and 4.3 manipulated uncertainty by displaying pictures of the economic crisis, Study 4.4 utilized natural occurring feelings of uncertainty after a terror attack, demonstrating the generalizability of the effects.

General discussion

The sustainability problems that the world faces today pose serious problems to our society. This makes sustainable behavior a priority for policy makers, responsible marketers, consumers, and academic researchers (Gardner & Stern, 2002; Spence et al., 2012). However, motivating consumers to act sustainably is a challenging task (Dietz et al., 2003; Penn, 2003). In addition, uncertainty is becoming more pronounced in modern life, which is evident through the increased occurrence of unpredictable events such as economic crises and terror attacks. The current research investigated the negative impact of uncertainty on sustainability, the mediating role of temporal discounting, and a possible strategy to mitigate this negative effect by emphasizing the immediate benefits of sustainability.

Four experiments showed convergent evidence for our predictions. Studies 4.1 and 4.2 showed that uncertainty leads to a lower preference for sustainable products in comparison to certainty. Participants were less willing to pay for sustainable products and preferred to buy conventional, luxury products over sustainable ones. Study 4.2 replicated this effect and, in addition, provided evidence for the mediating effect of temporal discounting. The results showed that participants who experienced higher levels of uncertainty displayed enhanced temporal discounting, indicating a

focus on immediate over future benefits. The heightened level of temporal discounting, in turn, negatively affected sustainable behavior. This reveals that uncertainty makes consumers more present oriented, which conflicts with the future focus of sustainable behavior, and thus decreases sustainable behavior. Study 4.3 showed that consumer attitudes towards sustainable products became more positive when immediate benefits were emphasized under uncertainty. This indicates that employing a communication strategy emphasizing the immediate benefits of sustainability is a valuable technique for policy makers and responsible marketers to promote sustainable behavior. Finally, Study 4.4 showed that this communication strategy can also be effective in the real world. In addition, it replicated the results with actual behavior. This shows that, as consumers are more oriented to the here-and-now when facing uncertainty, a message frame highlighting immediate benefits of sustainable products fits such a present orientation.

Theoretical implications

The current research contributes and extends literature on the understanding and the promotion of sustainable behavior in multiple ways. Scholars acknowledge that motivating people to behave sustainably is of paramount importance, but is also challenging (Clayton et al., 2015; Dietz et al., 2003; Spence & Pidgeon, 2010). A lot of work has focused on individual factors such as consumer knowledge, environmental concern, attitudes, norms, and values (Kollmuss & Agyeman, 2002). Although these internal factors are important, the effect of external factors on the willingness to behave sustainably has received less attention. Our research contributes to the literature by studying a key external factor that is highly prevalent in modern societies (Arkin et al., 2013), but has not yet been tested systematically in relation to sustainability: uncertainty. Examining sustainable behavior across contexts with varying levels of uncertainty contributes to existing knowledge and can set boundary conditions for accepted theories and findings in this field.

We proposed life history theory as a valuable theory to help explain why consumers act non-sustainably during uncertainty. We argued and showed that because people focus on short-term outcomes in unpredictable and unstable

environments, they behave less sustainably under uncertainty. In doing so, the current research follows an evolutionary perspective to study sustainable behavior, which fits well with recent calls to adopt an evolutionary perspective in consumer research (Hantula, 2003; Pham, 2013). Although life history theory is especially useful in explaining our findings given it is studying the impact of (un)certainty on people's behavior, there may be other tangential theoretical frameworks that can be linked to the findings. One such theoretical framework is construal level theory. Specifically, people seem to adopt a lower-level processing style (i.e., low-level construal), as compared to a higher-level processing style (i.e., high-level construal) when feeling threatened (Schwarz, 2002). Such low-level processing style makes people process information more detailed, which would fit more with concrete as opposed to abstract messages (Trope & Liberman, 2010). Indeed Van Dam and Van Trijp (2011) showed that in general, but not necessarily related to uncertainty, concrete messages predict sustainable behavior better as opposed to abstract messages.

Scholars in the area of decision making are not unanimous about whether certainty (i.e., getting something for sure versus a probability) or immediacy (i.e., getting something now versus getting more later) is a stronger predictor of people's behavior, and whether they are related or distinctive constructs. The current paper contributes to this stream of literature by taking a different approach of manipulating uncertainty, as we used exogenous manipulations (e.g., pictures and scenarios) instead of endogenous measures (probability discounting). In doing so, we find that uncertainty and temporal discounting are two distinctive constructs, which is more in line with Andreoni and Sprenger (2012), who claimed that certainty and immediacy are different constructs, than with Halevy (2008), who argued that they are closely related. Moreover, we found a causal relationship between uncertainty and temporal discounting, showing that uncertainty enhances people's temporal discounting. Hence, this finding is in line with Keren and Roelofsma (1995) who argued that immediacy is more likely a derivative of certainty, and contradictory to Rachlin, Logue, Gibbon, and Frankel (1986) who argued that this pattern is reversed.

Finally, this research contributes to previous research that demonstrated that here-and-now messages are a generally useful strategy to increase sustainable behavior

as opposed to messages highlighting its relevance for the future (Gardner & Stern, 2002; Leiserowitz, 2005; Li et al., 2011). Specifically, our work provides boundary conditions for the effectiveness of using here-and-now messages to promote sustainability. Particularly, we show that highlighting immediate benefits of sustainable behavior is mainly fruitful when facing uncertainty, but that this message frame does not affect sustainable behavior under certainty. Therefore, our findings indicate that it is important to adjust the marketing strategy for the promotion of sustainable behavior depending on uncertainty. During uncertainty, one should match the message frame to people's immediate orientation in order to promote sustainable behavior, whereas it is less systematically clear which message frame can be effective during certainty.

Policy and managerial implications

The current research aimed to provide practical insights applicable to the promotion of sustainable behavior for non-profits, for-profits, and governmental agencies. It provides insights into the conditions under which consumers behave more or less sustainably. For example, our findings are relevant for product managers and campaigners who search for the right timing to launch a new sustainable product, as they indicate that the probability of adoption will be lower during uncertain times as opposed to certain times, especially when the future benefits are advertised.

Furthermore, by understanding the fundamental needs of consumers under different situational contexts, such as uncertainty, policy makers, and marketers will be able to develop strategies that fit those needs of consumers better. During uncertain times or when uncertainty is activated, consumers are more encouraged to act sustainably when the immediate benefits of sustainable behavior are emphasized. This strategy is especially applicable for communication and advertising strategies (White & Simpson, 2013). For example, when consumers' motivations are focused on short-term outcomes due to uncertainty (e.g., during a recession), marketers can apply this knowledge by adjusting advertising messages and focusing on the immediate benefits of the sustainable product. In addition, when a product is sold in different countries,

the message can be adjusted depending on the country-specific level of uncertainty (e.g., using consumer confidence ratings as a proxy for uncertainty).

Instead of changing the message of the sustainable product, pro-social marketers and policy makers could also attempt to shift consumers' temporal focus during uncertain times. This could be done by highlighting the stability, predictability, and safety dimensions of the world in which consumers live (Griskevicius et al., 2012). Another way in which this could be done is by confronting consumers with nature. Research has shown that natural scenery (pictures of nature as well as being in nature) makes consumers value the future more and discount it less in comparison to urban scenery (Van der Wal, Schade, Krabbendam, & Van Vugt, 2013). Marketers and policy makers can use natural visuals while promoting sustainable behavior under uncertainty.

Limitations and future research directions

Following the convention in the marketing literature, our studies relied mostly on attitudinal and behavioral intention measures of sustainability. However, the field study complemented these measures by incorporating actual sustainable behavior (money donated to a sustainable non-profit organization). Further, an effort was made to further generalize the findings in multiple ways. Specifically, the current research found consistent support for the hypotheses across several uncertainty evoking situations, a broad range of product categories (e.g., jeans, lamps and fish), empirical settings (online, lab, and field), populations (students/non-students, travelers at a train station), and measures (attitudes, willingness to pay, actual donations).

As our results showed both partial and full mediation of temporal discounting, it leaves room for other underlying mechanisms that may explain why uncertainty makes consumers act less sustainably. Future research could examine whether self-control could explain part of the effect. For instance, recent research has shown that consumers become more impulsive (i.e., display lower levels of self-control) and make more unhealthy food choices under uncertainty (Milkman, 2012). Furthermore, it has been demonstrated that lower levels of self-control makes people more selfish and care

less for others (Balliet & Joireman, 2010) and that selfishness results in more non-sustainable behavior (Van Vugt et al., 1995).

Our research included different types of uncertainty, such as economic crisis, uncertainty arising after a terror attack, and feelings of uncertainty elicited through personal events. With the exception of Study 4.1, which activated uncertainty through the recall of both positive and negative uncertain events, the other studies focused on negative forms of uncertainty. However, when controlling for mood, the predicted effect remained, or were even strengthened, indicating that valence could not explain the effect. Future research could investigate the effects of positive uncertainty on sustainable behavior, such as digitalization and globalization (Arkin et al., 2013). Still, it is expected that positive uncertainty would show a similar pattern of results, as it is the unpredictability of uncertainty making people focus on the short-term outcomes, hindering sustainable behavior.

Conclusion

Since sustainability problems are significant and global, the necessity to act sustainably is acute. It is therefore critical to understand which conditions hinder or foster sustainable behavior. Our research shows that uncertainty leads consumers to act less sustainably. Although this is troubling, as uncertainty is highly prevalent in modern society, it does not mean that the promotion of sustainable behavior is destined to fail. Specifically, the current research shows that highlighting the immediate benefits of sustainable behavior during uncertainty can lead consumers to act more sustainably.

Chapter 5

Do natural landscapes reduce future discounting?

Abstract

An important barrier to enduring behavioral change is the human tendency to discount the future. Drawing on evolutionary theories of life history and biophilia, this study investigates whether exposure to natural versus urban landscapes affects people's temporal discount rates. The results of three studies, two laboratory studies and a field study reveal that individual discount rates are systematically lower after people have been exposed to scenes of natural environments as opposed to urban environments. Further, this effect is owing to people placing more value on the future after nature exposure. The finding that nature exposure reduces future discounting – as opposed to exposure to urban environments – conveys important implications for a range of personal and collective outcomes including healthy lifestyles, sustainable resource use and population growth.

This chapter is based on Van der Wal, A. J., Schade, H. M., Krabbendam, L. & Van Vugt, M. (2013). Do natural landscapes reduce future discounting? *Proceedings of the Royal Society of London, Series B, 280*: 177320132295.
http://dx.doi.org/10.1098/rspb.2013.2295

Introduction

An important barrier to fostering sustainable behavioral change is that humans have an evolved bias to prefer immediate rewards over long-term rewards (Dietz et al., 2003; Wilson & Daly, 2004). This universal and surprisingly strong tendency to discount the future is a contributing factor to various individual and societal challenges such as obesity, substance abuse, pollution, resource exploitation, and overpopulation (Diamond, 2005; Griskevicius et al., 2012). An important scientific question is whether people's discount rates vary, and if so why? Policy makers require better knowledge about human temporal discount functions to devise effective strategies to improve public health and conserve natural resources.

Evolutionary principles behind temporal discounting

Evolutionary theories of life history trade-offs suggest that organisms respond adaptively to environmental cues associated with the presence of threats and opportunities in their ecology (Kaplan & Gangestad, 2005). Organisms adopt a slow reproductive strategy when resources are abundant and the environment is relatively benign and stable, whereas they adopt a fast reproductive strategy when there is competition for resources, and the environment is relatively hostile and unstable (Ellis et al., 2009). Animal studies show that discount rates are higher in response to environmental factors (e.g., food scarcity). For instance, pigeons at 80% of their body weight selected the smaller immediate food reward more often than at 95% of their body weight (Snyderman, 1983). Human decision-making also varies predictably with ecological factors. In a study comparing different neighborhoods within the same city (Chicago, IL), the median age of mothers giving birth was 22.6 years in neighborhoods with a low life expectancy, whereas it was 27.3 years in neighborhoods with a high life expectancy (Wilson & Daly, 1997).

Environmental factors can affect the psychology of temporal decision-making more directly too. Temporal discounting is typically assessed by offering individuals choices between different monetary sums with different time intervals (Fredrick et al.,

2001). Although $100 is the same amount now or in one month's time, its value will be discounted when given with a delay. Individual differences in discount rates exist and they may be a function of socio-ecological factors. A recent study found that individuals who grew up in a poor and dangerous neighborhood discounted the future more after they were exposed to mortality cues (Griskevicius, Delton, et al., 2011).

Environmental influences on temporal discounting

Here, we argue that cues associated with environmental uncertainty and resource competition affect future discounting in humans. Inspired by the biophilia hypothesis, which assumes that humans have an innately emotional affiliation to other living organisms (Penn, 2003; Wilson, 2007), we believe that when people are being exposed to scenes of natural environments, as opposed to man-made, urban environments, this will reduce future discounting. Natural landscapes, especially lush ones, are intrinsically rewarding and enjoyable as they provide cues of predictability and resource abundance, at least for ancestral humans, whose psychology is likely to be still affecting modern humans (Griskevicius et al., 2012). By contrast, urban landscapes – which are entirely novel on an evolutionary time scale – are inherently unstable, and convey the perception of intense social competition among humans for all kinds of resources, such as status, goods, and mates. As a consequence, we hypothesize that exposure to natural scenes will make people discount the future less, whereas exposure to urban scenes will be likely to have the opposite effect.

This finding is in line with studies showing the positive effects of nature exposure on self-control and pro-sociality. A US study shows that city children who live in homes near nature score higher on tests of concentration, impulse inhibition, and delay of gratification (Faber Taylor, Kuo, & Sullivan, 2002). Similarly, priming adults with scenes of natural beauty increases other-regarding preferences (Weinstein et al., 2009).

The psychology of temporal discounting

No recent research has looked directly at whether exposure to nature versus urban scenes inspires people to reduce future discounting nor at its underlying proximate, psychological mechanisms. There are various possibilities. Peters and Büchel (2011) and Figner and colleagues (2010) show that temporal discounting decisions are influenced by two separate neural mechanisms having to do with either self-control or future valuation. There is evidence that exposure to nature increases self-control, as indicated by a study among inner urban children (Faber Taylor et al., 2002). After watching a short video of plants growing, consumers exercised more self-control in purchasing behavior (Das, Bushman, & Ardensen, 2010). In terms of valuing the future, several studies show that individuals become more environmentally aware after watching natural landscape scenes (Nisbet, Zelenski, & Murphy, 2009; Weinstein et al., 2009).

Thus, integrating evolutionary theories about life history and biophilia, our main hypothesis is that when people are exposed to scenes of natural landscapes their discount rates are lower compared to exposure to urban landscapes (H1). Further, this effect is expected to be mediated by either an increase in self-control (H2a), future reward valuation (H2b), or perhaps a combination (H2c) after nature exposure. We report the findings of two laboratory studies and a field study that are consistent with our main hypothesis. Based on previous studies, we also explore whether these effects are being moderated by the amount of nature available in the area in which participants currently live or grew up (Lederbogen et al., 2011).

Study 5.1

Study 5.1 tested H1: whether exposure to natural landscapes reduce future discounting compared to exposure to urban landscapes.

Method

Forty-seven participants (M_{age} = 20.23, *SD* = 2.16; 53.2% female), recruited through advertisements on posters in several university buildings, took part in the study. The standard protocol for this study (and the next) was as follows. Participants were welcomed by an research assistant, who was blind to the hypotheses, and randomly assigned by the order of arrival to the laboratory to either the nature or urban condition (between-subject design), which differed in the landscape depicted on the photograph stimuli (see Picture 5.1). Per condition, three photographs were displayed on the computer screen, each for 2 minutes, accompanied by an audio script to encourage participants to "immerse themselves in the environment shown in the photograph" (Weinstein et al., 2009). Thereafter, participants completed a standard temporal discounting game (Wilson & Daly, 2004). Participants made seven binary intertemporal choices between two monetary options: 100 euros now or a larger sum that grew with

Picture 5.1 *Photograph stimuli priming participants with either nature scenes (above) or urban scenes (below)*

10 euros increments from 110 to 170 euros, after 90 days. These responses determined each individual's indifference point, the choice at which participants switch from selecting the smaller immediate reward to the larger delayed reward (Lee, Krabbendam, Dekker, Boschloo, De Groot, & Jolles, 2012). A choice for a lower delayed reward (i.e., a lower indifference point) indicates lower discounting. Participants were informed that they would be paid the money of one of the choices they made in the temporal discounting game through random selection. For reasons of convenience, this amount was directly paid out after the study, accompanied with a debriefing about the study's purpose. Finally, participants answered two manipulation check questions ("How urban (natural) did you find the scenes in the photographs?") and reported their demographics, including gender, age, and the postal codes of their former and current homes to calculate an index of the naturalness of the home environment, following the Netherlands Bureau of Statistics guidelines (CBS, 2011).

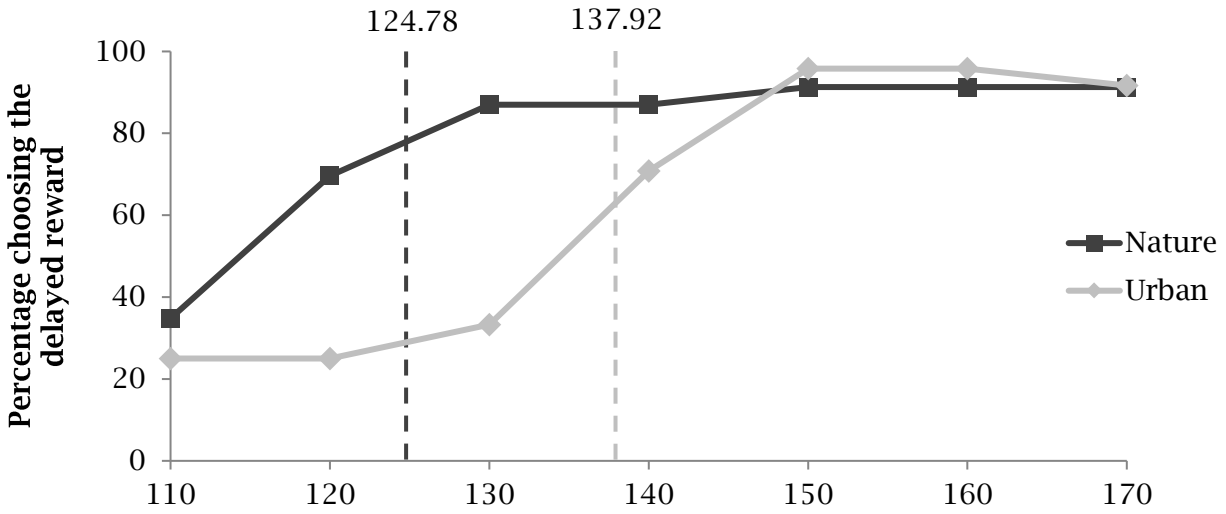
Results

If not mentioned otherwise, the analyses were conducted with the general linear model. Statistical assumptions of normal distribution as well as homogeneity were met. There were no differences between the conditions regarding age or gender and these did not influence discount rates (all *p*s > .05). Nature photographs were indeed rated as more natural than the urban photographs, M_{Nature} = 6.61 (*SD* = 1.27) vs. M_{Urban} = 1.42 (*SD* = 0.78), and less urban than the urban photographs, M_{Nature} = 1.26 (*SD* = 0.92) vs. M_{Urban} = 5.71 (*SD* = 0.96). Hence, the manipulation seems to be effective.

Confirming the main hypothesis, the results of Study 5.1 showed that nature exposure significantly influenced temporal discounting in the predicted direction, $F(1, 45) = 5.31$, $p = .03$, part. $\eta^2 = .11$. The individual indifference point – the point at which people switch to the larger delayed reward – was lower for participants in the nature condition compared to the participants in the urban condition, M_{Nature} = 124.78 (*SD* = 19.97) and M_{Urban} = 137.92 (*SD* = 19.11). Taken together, participants in the nature condition showed about a 10% lower temporal discount rate than participants in the urban condition. Regression analyses finally revealed that future discounting was not affected by the greenness of the area in which people either currently live in or grew

up in, both *p*s > .05. Figure 5.1 shows the main effect of the nature versus urban condition on temporal discounting, by indicating the percentages of participants choosing the bigger future reward over the smaller immediate reward.

Figure 5.1 *Percentage of participants that preferred the 'x' amount of euros in 90 days over the 100 euros now, including participants' average individual indifference point for each condition*



Study 5.2

Study 5.2 aimed to find evidence for the proximate psychological mechanisms driving the difference between natural versus urban landscape exposure. Is the difference in discounting mediated by an increase in self-control, future reward valuation, or perhaps a combination? We added a control condition without a photograph manipulation to examine whether either the nature or urban landscape manipulation was driving the effect on temporal discounting. We also used a different temporal discounting game.

Method

The same recruitment procedure was used as for Study 5.1. Sixty-seven participants (M_{age} = 20.03, *SD* = 1.83; 71.6% female) were randomly assigned (by order of arrival to the laboratory by an assistant blind to the hypotheses) to either the nature, urban or control condition. Through checking their email addresses, it was ensured that none of the participants in the first study took part. Participants were primed by three nature or urban landscape photographs (similar to Study 5.1), in the control condition, no prime was administered. Participants completed a temporal discounting game developed by Kirby, Petry, & Bickel (1999). They made 18 inter-temporal choices between two monetary options each: a specified sum now (ranging from 11 to 80 euros) or a larger sum (ranging from 25 to 85 euros) after a specified delay, ranging from 7 to 91 days. Choices were converted into a discount-rate parameter (*k*), ranging from .0025 to .25 (*k* = (future euro/now euro – 1)/delay (in days); Kirby et al., 1999). A lower discount-rate parameter indicates less temporal discounting.

We administered the standard Stroop color-word test as a measure of self-control (Stroop, 1935) and a future valuation task, in counterbalanced order. Participants completed 18 congruent and 18 incongruent trials of the Stroop Color-Word Test. A higher reaction time difference between the incongruent and the congruent trials indicates lower levels of self-control. In the valuation task, participants rated 18 single pay-offs from the Kirby and colleagues (1999) temporal discounting game (e.g., 80 euros in 14 days) on a Likert scale ranging from 0 (*very unattractive*) to 100 (*very attractive*; Figner et al., 2010). Finally, participants answered the manipulation checks and demographic questions, and got paid the amount of one (randomly selected) choice they made in the game.

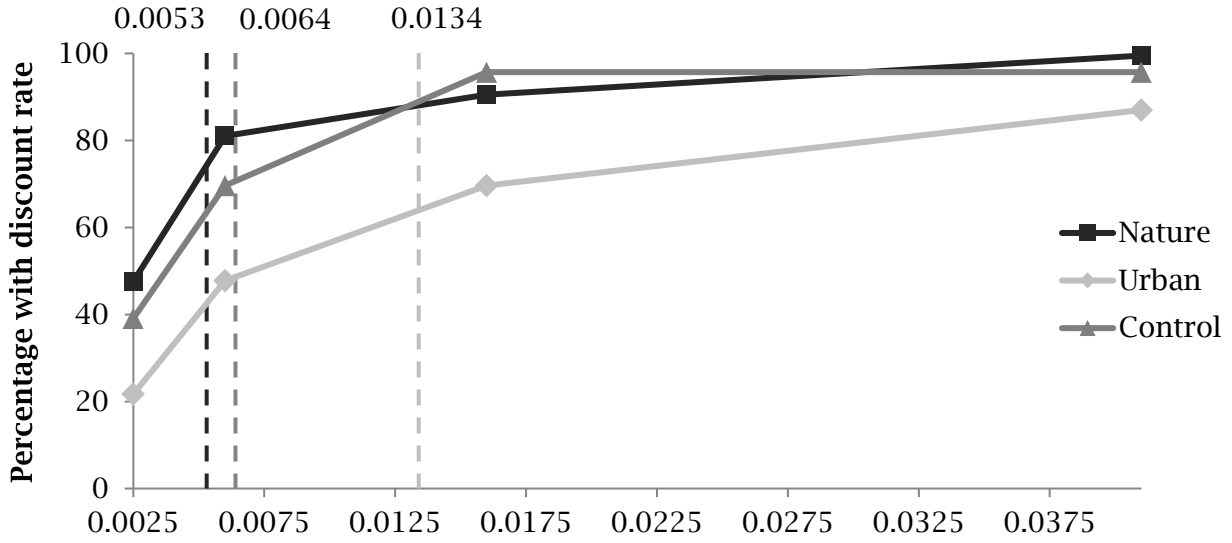
Results

The analyses were again conducted with the general linear model and statistical assumption of normal distribution and homogeneity were met. No differences were found for age or gender between conditions, both *p*s > .05. Nature photographs were again rated more natural than the urban photographs, M_{Nature} = 6.81 (*SD* = 0.40) vs. M_{Urban}

= 1.48 (*SD* = 0.73), and less urban than the urban photographs, M_{Nature} = 1.14 (*SD* = 0.36) vs. M_{Urban} = 5.74 (*SD* = 1.25).

H1 was again confirmed. Condition affected temporal discounting, *F*(2, 64) = 3.69, *p* = .03, part. η^2 = 0.10. Post-hoc analyses showed that the individual indifference point in the nature condition (M_{Nature} = 0.0053, *SD* = 0.0009) was lower than in the urban condition (M_{Urban} = 0.0134, *SD* = 0.0036), *p* = 0.01. This indicates that participants in the nature condition showed, on average, 16% reduction in future discounting compared to the urban condition. The control condition fell in between the nature versus urban conditions ($M_{Control}$ = 0.0064, *SD* = 0.0014), yet these difference was not statistically significant, all *p*s > .05. Figure 5.2 shows the main effect of the nature versus urban condition on temporal discounting, by indicating participants discount rate parameters (*k*).

Figure 5.2 *Percentage of participants that were indifferent at the different discount–rate parameters (k), including participants' average individual indifference point for each condition*



No overall effect was found of condition on future valuation, *F*(2, 64) = 2.01, *p* = .14, however post-hoc analyses suggest that participants in the nature condition

(M_{Nature} = 70.45, SD = 14.13) valued future rewards more than the control condition ($M_{Control}$ = 59.18, SD = 18.29), p = .049. The urban condition (M_{Urban} = 64.40, SD = 22.23) did not differ significantly from the control condition, p > .05. This seems to indicate that nature exposure increases future valuation, confirming H2b. Regression analysis showed that future valuation predicted temporal discounting, b = -0.001, F(1, 65) = 28.92, p < .001, part. η^2 = .31. To establish whether future valuation mediates the effect of nature exposure on temporal discounting, indirect effects analysis by Preacher and Hayes (2008) was conducted. For this analysis the urban and control condition were combined because they did not differ on discounting and future valuation. The effect of condition on the discount-rate parameter was mediated by the valuation of the future rewards as predicted by H2b, b = -0.009, 95% CI [-0.029, -0.001].

Analyses with regard to self-control revealed no effect across the three conditions, F(2, 64) = 2.36, p = .10. Posthoc analyses showed that participants in the nature condition (M_{Nature} = -3.93 ms, SD = 18.11) had a lower reaction time difference between the incongruent and the congruent trials of the Stroop Color-Word Test, compared to the control condition ($M_{Control}$ = 50.41 ms, SD = 17.31), p = .03. However, this effect was completely driven by outliers (one participant in the nature condition showed a reaction time difference of -383.83 ms and three outliers in the control condition showed a reaction time difference greater than 225 ms). In addition, regression analysis showed that the performance on the Stroop Color-Word Test did not predict temporal discounting, p > .05. Thus, both Hypotheses 2a and 2c can be rejected. Finally, temporal discounting was not affected by whether people currently live or grew up in a green environment, both ps > .05.

Study 5.3

Study 5.3 was a field study in which we examined whether the differences in temporal discounting also occurred when participants were asked to walk through either a real natural or urban landscape environment.

Method

Advertisements about the study were placed at grocery stores in the city of Amsterdam, the Netherlands, to recruit participants. Forty-three participants (M_{age} = 31.84, *SD* = 11.76; 60.5% female) took part and were randomly assigned (by the order of contacting us) to either the Amsterdam forest (nature condition) or to the Amsterdam Zuidas, which is a built-up area of Amsterdam (urban condition). Participants and experimental assistants (blind to the hypotheses) met at the location of the study. A map with directions was sent by email. Participants were asked to immerse themselves in the environment by walking through it by themselves for 5 min. Thereafter, participants sat down on a bench and received a tablet from the assistant to complete the temporal discounting game by Wilson and Daly (2004; similar to Study 5.1). Future valuation was assessed with the same task as in Study 5.2 and self-control was being assessed with the State Ego-Depletion Scale (α = 0.88; Twenge, Muraven, & Tice, 2004). This scale contained 25 items (e.g., "Right now, it would take a lot of effort for me to concentrate on something") rated on a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). We also administered a mood scale (α = 0.76; Mayer & Gaschke, 1988). The scale contained 16 items (e.g., "I feel jittery" and "I feel happy") rated on a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Finally, participants reported their demographics and got paid according to one of the (randomly selected) intertemporal choices they made in the decision task.

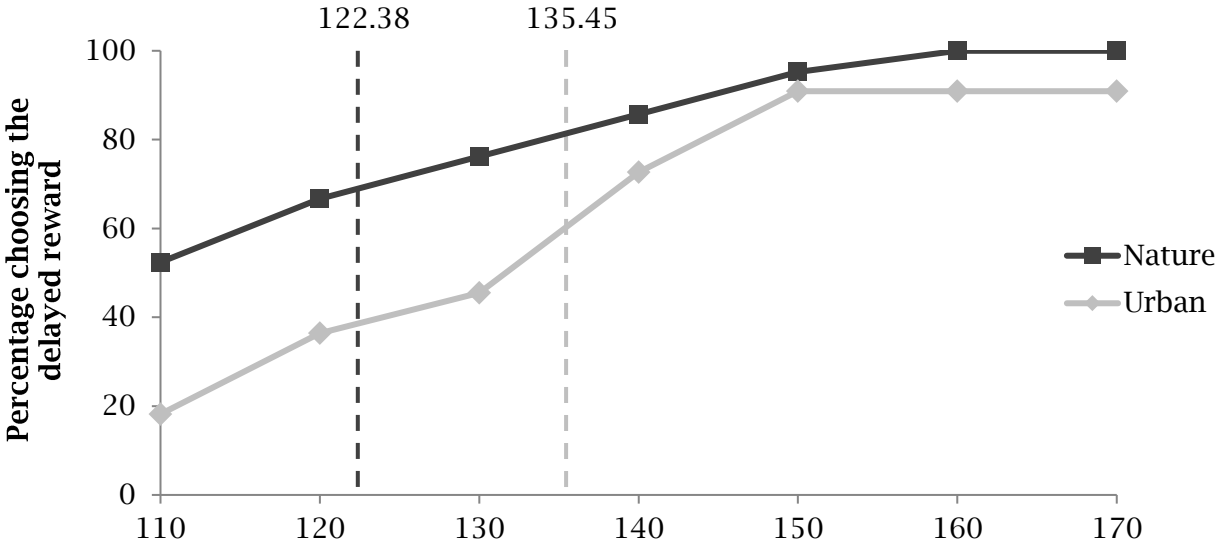
Results

Analyses were again performed with the general linear model and statistical assumptions of normal distribution and homogeneity of data were met. There were no demographic differences between conditions, all *p*s > .05. Participants in the nature condition reported a greater positive mood than in the urban condition, $F(1, 41) = 4.54$, $p = .04$, part. $\eta^2 = .14$, with $M_{Nature} = 5.53$ ($SD = 0.40$) and $M_{Urban} = 5.14$ ($SD = 0.60$). However, mood did not affect temporal discounting, $p > .05$.

Confirming H1, participants in the nature versus urban condition showed a significant difference in temporal discounting, $F(1, 41) = 5.41$, $p = .03$, part. $\eta^2 = .12$. In

the nature condition the individual indifference point of the participants was lower than in the urban condition, with M_{Nature} = 122.38 (*SD* = 16.40) and M_{Urban} = 135.45 (*SD* = 20.17). On average, we found a 10% reduction in future discounting in the nature condition versus urban condition. Figure 5.3 shows the main effect of the nature versus urban condition on temporal discounting, by indicating the percentages of participants choosing the bigger future reward over the smaller immediate reward.

Figure 5.3 *Percentage of participants that preferred the 'x' amount of euros in 90 days over the 100 euros now, including participants' average individual indifference point for each condition*



Confirming H2b, participants in the nature condition valued future rewards more than participants in the urban condition, $F(1, 41) = 7.12$, $p = .01$, part. $\eta^2 = 0.15$, with M_{Nature} = 91.62 (*SD* = 13.25) and M_{Urban} = 73.82 (*SD* = 27.68). Regression analyses showed that future valuation predicted temporal discounting, b = -0.41, $F(1, 41)$ = 13.17, $p = .001$, part. $\eta^2 = .24$. The indirect effects analyses by Preacher and Hayes (2008) revealed that future valuation mediated the relationship between nature (versus urban) exposure and temporal discounting, b = -6.26, 95% CI [-16.26, -0.38]. No effect of condition on self-control was found, $p > .05$, nor did self-control predict temporal

discounting, $p > .05$. Finally, regression analyses showed that temporal discounting was not affected by whether people grew up or currently lived in a rural or urban environment, both ps $> .05$.

Discussion

All three studies, including a fairly realistic field study, showed that exposure to natural landscapes decreases temporal discounting and makes people care more for the future, with discount rates decreasing by 10-16% after nature exposure than after exposure to urban landscapes. Thus, cues of natural environments – as opposed to man-made urban environments – entice people to prefer greater delayed rewards over smaller immediate rewards. This is an important result because delay of gratification is an essential ingredient for promoting individual and social change pertaining to, for instance, healthy lifestyles, antisocial behavior, resource conservation, and population growth (Griskevicius et al., 2012). The results show further that, at the proximate psychological level, the beneficial effects of nature are mainly owing to people caring more about the future rather than a greater self-control or better mood. This is consistent with research showing that scenes of nature increase people's environmental awareness (Nisbet et al., 2009).

In terms of ultimate evolutionary explanations, our findings could be interpreted in terms of life history trade-offs. Urban landscapes are inherently unpredictable as they convey intense social competition for status, goods, and mates, and so they may entice people – either consciously or subconsciously – to adopt a faster life history. By contrast, nature exposure may encourage individuals to adopt a slower life history strategy, perhaps because natural environments convey an abundance of natural resources, and hence less competition. This explanation is further consistent with the biophilia hypothesis by revealing the beneficial effects of nature exposure on short- and long-term well-being (Penn, 2003; Wilson, 2007).

We should note various limitations of our research. First, our studies only used photographs of lush, green landscapes and it would be interesting to include dry,

barren nature scenes in further research too. Future studies could also look at the impact of natural scenes with differing degrees of biodiversity on temporal discounting. Second, employing a within subject (rather than a between subject) design would have been stronger for detecting individual fluctuations in discount rates as a result of the manipulations, yet at the risk of participants guessing the study's predictions. A within-subject design could also have revealed whether the effect we found are owing to a reduced temporal discounting after nature exposure or an increased temporal discounting after urban exposure. The inclusion of a control condition was not conclusive, but the future valuation results suggest that nature exposure was driving the discounting difference. Finally, we examined various proximate psychological mediators of the nature-discounting effect, including mood, self-control, and future valuation, but only found a mediating effect for the latter. Before dismissing the role of mood or psychological self-control, it would be useful to include a better measures, such as PANAS (for mood; Crawford & Henry, 2004) and the Tower Task (for self-control; Duckworth & Kern, 2011). A final suggestion for future research would be to add neuroscience measures, such as ERP and fMRI, to look more closely at the neural correlates of nature versus urban exposure on temporal discounting (Lederbogen et al., 2011).

Conclusion

Many of the social and environmental problems the world faces nowadays, such as poverty, substance abuse, overpopulation, and resource exploitation, are caused by citizens – and sometimes governments – adopting short-term decision making strategies (Griskevicius et al., 2012; Vlek & Keren, 1993). Our main finding suggests that exposing people to natural landscapes extends their time horizons, whereas exposure to urban landscapes narrows people's time perspectives. With the majority of people in the world now living in towns and cities, it may be important to find ways to unleash people's innate biophilia (Wilson, 2007).

Chapter 6

General discussion

Scholars acknowledge that motivating people to behave sustainably is of paramount importance (Clayton et al., 2015), but entails difficulties (Dietz et al., 2003; Spence & Pidgeon, 2010). A significant portion of the extant literature on the promotion of sustainable behavior focused on proximate motivations that are concerned with the relatively immediate triggers for behavior, such as personality, learning, culture, incentives, preferences, utility, pleasure, happiness, values, and emotions (Griskevicius et al., 2012; Penn, 2003). In line with Griskevicius and colleagues (2010), this dissertation contributes to, and goes beyond, this existing knowledge by taking an evolutionary perspective in studying sustainability. The importance of using an evolutionary perspective within sustainability and consumer behavior research is to get an understanding of the ultimate motivations (i.e., innate/instinctive) that drive consumer behavior. In this way, this dissertation offers a more in-depth understanding of human behavior, as it explains behavior by means of its adaptive function (i.e., why it would have yielded survival fitness; Griskevicius et al., 2012; Kenrick et al., 2010; Saad, 2013; Scott-Phillips et al., 2011). An evolutionary perspective offers a meta theory that can be added to the theoretical arsenal (Saad, 2007; Saad & Gill, 2000) and adopting such an approach is in line with recent calls for integrating an evolutionary perspective into research on consumer behavior (Hantula, 2003; Pham, 2013).

Particularly, the current dissertation includes four empirical chapters (Chapters 2-5), which empirically tested strategies to foster sustainable behavior that tap into four aspects of humans' innate nature. Chapter 2 builds on the premise that people are by nature self-interested (Barrett et al., 2002; Buss, 1999) and competition – as it provides self-interest benefits – can therefore be used as a driving force to change/elicit people's behavior. Chapter 3 builds on the premise that people act altruistically due to its status benefits as explained by the competitive altruism theory (Hardy & Van Vugt, 2006; Roberts, 1998) and that status motives can therefore promote sustainable behavior. Chapter 4 builds on the premise that people are more prone to opt for immediate gratification during uncertainty (Griskevicius, Tybur, et al., 2011) and that emphasizing immediate benefits of sustainability could foster sustainable behavior during uncertain times. Chapter 5 builds on the premise that people are biophilic by nature and therefore emotionally affiliate to other living organisms (Wilson, 2007),

which could enhance their sustainable behavior when being exposed to natural environments.

Intriguingly and at times, counterintuitively, this dissertation shows that strategies promoting sustainable behavior that matches people's ultimate motivations not merely yield sustainable attitudes and behavioral intentions, but also actual sustainable behavior such as recycling (Chapter 2), donations to sustainable non-governmental organizations (Chapters 2 and 4), and sustainable shopping (Chapter 3). In doing so, it affirms that an evolutionary perspective is a valuable approach to help narrowing the sustainable intention-behavior gap (Csutora, 2012; Kennedy et al., 2009; Kollmuss & Agyeman, 2002). This is particularly important, as it is of great relevance to find strategies that goes beyond simply increasing awareness about sustainability problems without increasing actual sustainable behavior (Luchs et al., 2010). Even though Chapter 5 did not measure sustainable behavior, the combined results of Chapter 5 (nature reduces temporal discounting) and Chapter 4 (temporal discounting decreases sustainable behavior) suggest that nature enhances sustainable behavior by means of a reduced level of temporal discounting.

Summary of empirical findings

The findings of Chapter 2 show, in two lab experiments, one online experiment, and one experimental field study, that competition increases sustainable behavior. A sustainable competition (reading and writing about joining a sustainability competition as opposed to a sustainability discussion group) yielded more intentional sustainable grocery shopping, monetary donations to WWF, and actual recycling behavior. Moreover, this was studied for both pro-selves (who are concerned with maximizing their own outcomes) and pro-socials (who are concerned with maximizing outcomes for the common good) and found that the positive effect of competition on sustainable behavior is mainly driven by the fact that pro-selves display more sustainable behavior when competition (relative to no competition) is induced. It is argued that this is due to the fact that a competition provides the opportunity to obtain self-interest benefits, such as prizes/awards, positive self-image, prestige, pride, and excitement (Connelly

et al., 2014; Lim, 2010; Terwiesch & Xu, 2008). Furthermore, the results show that pro-socials are in general more inclined to act sustainably and are therefore merely influenced by the sustainable outcome of the competition. Overall, the results demonstrate that competition is a valuable strategy to promote sustainability, as it even persuades pro-selves to act sustainably, while not alienate those who already care about sustainability (i.e., pro-socials).

Chapter 3 replicates, in an observational field study, the finding that status motives increase sustainable behavior when it can be publicly displayed (Griskevicius et al., 2010) in the context of sustainable grocery shopping. Importantly, however, the findings show that status motives have a downside effect. People who shop at a high-status oriented sustainable grocery store, buy more plastic branded shopping bags than people who buy at a low-status oriented sustainable grocery store. This is of course detrimental for the environment, as plastic shopping bags pile up waste and are a significant source of the plastic soup in oceans and seas (Xanthos & Walker, 2017). In other words, people who act sustainably for status motives want to show this publicly, at the expense of the environment. In general, status can be a valuable strategy to promote sustainable behavior, but one should keep this paradoxical effect in mind.

Results of Chapter 4 show, in two lab experiments, one online experiment, and one experimental field study, that uncertainty (i.e., the inability to estimate the impact of external, societal events on one's life, and the inability to predict their associated outcomes) hinders people to act sustainably. Moreover, the results provide evidence for the underlying mechanism that people become more myopic, and focus on the immediate benefits during uncertainty, which is contradictory to the future orientation associated with sustainability (Luchs et al., 2010; Phipps et al., 2013). Importantly, based on life history theory, evidence was provided for a valuable strategy that can foster sustainable behavior even during uncertain times: emphasizing the immediate benefits of acting sustainable. Specifically, people valued sustainable products more and donated more money to a sustainable non-profit organization when immediate benefits of the products and the environmental cause where emphasized as opposed to the future benefits.

Chapter 5 shows, in two lab experiments and one experimental field study, that people display more future oriented behavior when being exposed to the natural environment as opposed to a city environment. The underlying mechanism of this positive effect derives from the fact that people value the future more when surrounded by nature. Since this heightened future orientation is in line with the future aspect of sustainability, exposing people to nature (either by pictures, or by actual nature) might be a valuable strategy to increase sustainable behavior. These findings also suggest that when people are more present oriented (e.g., during uncertain situations) exposure to nature might be a successful approach. Hence, during uncertainty exposure to nature might be an alternative strategy to buffer or even counter the negative effect of uncertainty on sustainable behavior.

Overall, in each chapter, except for Chapter 3, multiple studies were conducted to test the sustainable strategies. Since Chapter 3 was already a replication study – replicating the effect of "green to be seen" of Griskevicius and colleagues (2010) – this indicates that all strategies are repeatedly proven to be successful in promoting sustainable behavior. In addition, the replication was across different settings (lab, online, field) and reached out to different populations, which increased the generalizability of the sustainable strategies. Moreover, field studies made it possible to increase the external validity of the sustainable strategies tested, as they measured people's actual sustainable behavior in a real life setting.

Theoretical implications

Within all four chapters, this dissertation explored the adoption of an evolutionary perspective – focusing on people's ultimate (i.e., innate/instinctive) motivations, which originate from human nature during ancestral times – in studying sustainable behavior. This fits well with recent calls to adopt an evolutionary perspective in consumer research, to lessen the emphasis on micro-level, proximate explanations and embrace a broader epistemology (Hantula, 2003; Pham, 2013). Indeed, it contributes to the sustainability and consumer behavior literatures that mainly focus on humans' proximate motivations (Griskevicius et al., 2012; Penn, 2003) and often struggle with

the so-called sustainable intention-behavior gap (Csutora, 2012; Kennedy et al., 2009; Kollmuss & Agyeman, 2002). Furthermore, this dissertation provides some novel insights about how ultimate and proximate motivations interact and can complement one another – an understudied area. Additionally, it discusses the potential impact and limitations of the studied ultimate motivations in the context of influencing people's behavior.

A first key implication from the findings of this dissertation is that sustainability strategies that match people's ultimate motivations narrow the sustainable intention-behavior gap, as these innate motives are strong and rather subconscious behavioral drivers on which people act more instinctively as opposed to cognitively (Barrett & Kurzban, 2006; Kenrick et al., 2010). In addition, these strategies might diminish the licensing effect of people behaving less morally after doing something good (Mazar & Zhong, 2010). Previous researcher did show that people – in particular those that are not intrinsically motivated to act sustainably – use their sustainable behavior to license non-sustainable actions that follow (Meijers et al., 2015). Due to the instinctive rather than cognitive nature of ultimate motivations, such a licensing seems less likely to occur when strategies to promote sustainable behavior appeal to these innate motives as opposed to moral motives.

A second implication is the emphasis that proximate and ultimate motivations can influence one another. Typically ultimate and proximate motivations seem to be regarded as two parallel but separate functioning explanations for behavior (Griskevicius et al., 2012; Scott-Phillips et al., 2011). To the best of my knowledge, no research has tested whether these two motivations could actually influence one another. It is therefore of great interest that Chapter 2 shows that the proximate motivation of social value orientation does seem to influence the strength at which people's competitive nature – derived from the ultimate motivation of prioritizing individual over collective interest – drives their sustainable behavior. Specifically, findings indicate that competition enhances sustainable behavior, but that this is higher for pro-selves in comparison to pro-socials. This might be in line with the theory of gene-culture coevolution, which state that the social environment influences the course of genetic evolution (Feldman & Laland, 1996). At least in the sense, that there

is an interplay between people's values, which are often shaped by culture (Schwartz & Sagiv, 1995), and genetic imprint of being self-interested.

A third implication is that ultimate and proximate motivations can complement one another. Based on life history theory, Chapter 4 shows that it is important to emphasize the immediate benefits of sustainability during uncertain times to foster sustainable behavior, as people are then more oriented towards the here-and-now. Alternatively, construal level theory – representing proximate explanations of human behavior – argues that when psychological distance is high (e.g., during uncertainty) it is of importance to provide concrete as opposed to abstract messages in order to enhance people's sustainable behavior (Van Dam & Van Trijp, 2011). Complementing both strategies – combining them into messages emphasizing immediate benefits in a concrete manner – could further buffer and counter the negative effect of uncertainty on sustainable behavior. On the other hand, people become more future oriented when they are exposed to natural landscapes (Chapter 5). Construal level theory argues that abstract messages are of relevance to enhance people's sustainable behavior when psychological distance is low (e.g., during nature exposure). Hence, combining nature exposure with abstract messages could be fruitful in the promotion of sustainable behavior. This is in line with previous research proclaiming that ultimate and proximate motivations explain human behavior in different ways and that it is therefore valuable to incorporate both perspectives (Barrett et al., 2002; Pham, 2013).

A fourth implication from the findings of this dissertation is that not all ultimate motivations are equally impactful. For instance, the ultimate motivation of prioritizing individual over collective interest seems to be a stronger predictor of sustainable behavior than the ultimate motivation of desiring relative over absolute status. This is due to the fact that in order to enhance sustainable behavior, status motives are restricted to a public setting, in which people can display their sustainable actions to others (Chapter 3; Griskevicius et al., 2010), whereas self-interest motives increases sustainable behavior not merely in a public setting, but also in a private setting (Chapter 4). Kenrick and colleagues (2010) compare the potential impact of different ultimate motivations in their attempt to "renovate" Maslow's pyramid of needs (Maslow, 1943). They argue that humans have seven hierarchical fundamental motives,

with immediate physiological needs and self-protection at the bottom of the pyramid, status at the middle, and parenting at the top. The current dissertation contributes to this previous work by empirically showing that the impact on people's (sustainable) behavior seems to be different for individual ultimate motivations. Still, it is a bit unclear whether the ultimate motivation of prioritizing individual over collective interest – driven by the urge to replicate one's own genes – fits best in the hierarchical pyramid of fundamental human motives, as it seems to relate to both self-protection as well as parenting.

Finally, this dissertation also addresses a critical note about the way some ultimate motivations can be applied for sustainable behavior. Evolutionary scholars speak highly of the usage of ultimate motivations to foster sustainable behavior by sustainable marketers, non-profit organizations, and policy makers (Griskevicius et al., 2010; Van Vugt, 2009). However, it is important to be aware of the limitations associated with using some of these motivations, especially status motives, as a mean to foster sustainable behavior. The paradox of this motive is that people who act sustainably for status reasons are not necessarily intrinsically motivated to do so. For the sake of their own reputation (i.e., status) those people then act sustainably as it provides a costly signal which can be publicly displayed. Yet, in order to publicly display their sustainable behavior they use non-sustainable means (e.g., buying a branded plastic shopping bag from a sustainable grocery store) with obvious detrimental consequences for the environment (Chapter 3). In other words, people want to display their sustainable behavior even at the expense of the environment. This is in line with previous literature showing that ultimate motivations are in their essence not positively related with sustainable behavior (Griskevicius et al., 2012; Penn, 2003). It is therefore of particular importance to be cautious when using these motives as a strategy to promote sustainable behavior.

Practical implications for sustainable marketers, non–profit organizations, and policy makers

The main objective of the current dissertation was to provide strategies – harnessing people's ancestral roots – that could foster sustainable behavior and are relatively easy implementable by marketers, public policy makers, and non-profit organizations that are interested in promoting sustainable behavior. The advantage of using strategies that are in line with people's innate behavioral tendencies is that they are a more unconscious (instinctive and emotive) rather than conscious (based on reasoning and morals) appeal to sustainable actions. As consumers are less aware of these strong motivational drivers, these ancestral based strategies might be more successful to help narrowing the intention-behavior gap in a sustainability context (Csutora, 2012; Kennedy et al., 2009; Kollmuss & Agyeman, 2002). This is particularly important, as many persuasion strategies do not match these innate behavioral tendencies (e.g., asking people to value the collective interest over the individual interest and/or asking people to value future needs more than current needs) and are therefore less effective or only of interest to those that are already more inclined to act sustainably (Griskevicius et al., 2012; Penn, 2003).

Based on the four premises that humans are (1) self-interested by nature, (2) driven by status motives, (3) temporal myopic, and (4) biophilic, each chapter provides valuable implications for practitioners, accordingly: Create sustainability competitions, make sustainability a status symbol, highlight the immediate benefits of sustainability, and expose people to nature scenery. Jointly, the chapters provide some overarching insights to foster sustainable behavior.

Sustainability as a competition

Creating a competition in which people can compete to be the most sustainable is a strategy that is implementable in a broad range of settings. For instance, it can be used by companies to promote sustainable behavior among employees (e.g., commuting-with-the-lowest-CO_2-footprint competition[3]) or by marketers to sell more sustainable

products (e.g., sustainability design competition[9]). Furthermore, it can be used in a policy context (governmental or non-governmental) as well. One can think of an energy reduction competition between neighborhoods (e.g., Klimaatstraatfeest[10]) or a competition for being the greenest city or village to foster more sustainable policies within municipalities (e.g., Entente Florale Europe[4]). Competition could even be relevant in an educational context, teaching children about sustainability problems (e.g., recycling game[11]).

The strong benefits of using a competition-based strategy to promote sustainability, is that it appeals to a broad public: both pro-socials and pro-selves. Moreover, it is particularly effective for pro-selves who are naturally less willing to act sustainably. This is of utmost importance, as marketing strategies thus far mainly focus on the social aspects of sustainability (Gardner & Stern, 2002; Griskevicius et al., 2012; Nolan et al., 2008; Penn, 2003). These strategies preach to the choir, as they are effective among pro-socials who are already motivated to act sustainably, and often miss out on pro-selves or are less effective with the latter audience.

Sustainability as status symbol (with some caution)

Since acquiring status is such an important innate motive, it is advisable to emphasize the status benefits of sustainable behavior within environmental campaigns and advertisements, and to make it possible for people to publicly demonstrate their sustainable behavior. For example, publicly available ranking lists by which people can show off their sustainable behavior in comparison to others (i.e., relative status). The Dow Jones Index, for example, already makes use of this principle by having a sustainability ranking for companies (Dow Jones Sustainability Index[12]). Motivating people to share their sustainable behavior and purchases on social media, or providing personal parking places for people who drive electric cars are other examples. Another successful strategy may involve selling environmental-friendly, high status products, such as the Tesla.[13]

However, while harnessing people's innate status motives to promote sustainability, one must keep in mind that these motives can potentially have aversive

environmental costs. This dissertation shows, for instance, that high-status sustainable grocery store shoppers buy more original branded plastic shopping bags from the sustainable grocery chain to publicly demonstrate their sustainable behavior. It is therefore important to use the status strategy with caution and offer environmental friendly alternatives for people to publicly display their sustainable behavior.

Highlighting immediate benefits of sustainability

During uncertainty people become temporal myopic and want to obtain immediate benefits rather than future benefits. Since people have to cope with high levels of uncertainty in their every-day life, due to terror attacks, volatile economies, and intensive migration, it is therefore important to adjust the strategies to promote sustainability accordingly. In other words, in order to fit people's need for immediacy when facing uncertainty, policy makers and marketers should develop strategies that highlight the immediate benefits of sustainable behavior. It is particularly applicable for communication of advertising messages of sustainable products, as marketers can apply this knowledge by adjusting the advertising messages and focus on the sustainable product's immediate benefits during uncertain times. During certain times, the temporal aspects are of lower importance, or, according to evolutionary theory, opposite to that of uncertain times. This means, that highlighting the future benefits of sustainable products or behavior during certainty might be a valuable strategy.

Furthermore, the level of uncertainty is in general an important boundary condition to take into account while promoting sustainability, as uncertainty decreases people's sustainable behavior. Product managers and campaigners, who search for the right timing to launch a new sustainable product, therefore need to be aware of the fact that the probability of adopting sustainable products by potential customers will be less likely during uncertain times as opposed to certain times. Also, sustainable marketers can re-position their message and/or product/service to be perceived as less uncertain.

Making use of nature scenery

Instead of changing the message accompanying sustainability into highlighting its immediate benefits, one can also attempt to shift people's temporal focus from immediate oriented towards future oriented. Empirical evidence was found that nature can be of importance in doing so, as nature exposure increases people's future orientation. Specifically, according to the findings of this dissertation, natural scenery (pictures of nature as well as being in nature) makes people value the future more and discount it less as opposed to urban scenery. This indicates that marketers from for-profits and non-profits organizations can benefit from using natural-related visuals while promoting sustainable behavior.

For government agencies and municipalities it would be advisable to increase level of greenery in highly urban environments. In addition, (re)introducing nature education and nature visits in all layers of education would be a strategic way to expose people already from a young age to nature. Making it attractive for citizens to visit nature scenery in their spare time could be another alternative of bringing people into contact with nature.

Overarching insights to foster sustainable behavior

Besides the above four implications based on the specific premises that were tested in this dissertation, sustainable marketers and policy makers may want to tailor their strategy based on the specific context, target audience and type of product or particular behavior considered. This suggests that it may be relevant to combine both the ultimate and proximate motivations of people when selecting the sustainability strategy. For instance, this dissertation shows that highlighting immediate benefits of sustainable behavior is of importance when circumstances are uncertain, as opposed to certain. Preliminary data also show that nearby nature for city dwellers predicts sustainable behavior (e.g., being a customer of a sustainable bank or energy supplier) better than nearby nature in general (Van der Wal & Boter, 2014). This would indicate that nature exposure might be especially relevant for the promotion of sustainable behavior among city dwellers. Furthermore, status motives are of greater importance for men than

women (Barrett et al., 2002; Buss, 1999) and it is therefore of interest to adjust the sustainable marketing or policy to the specific target audience.

The best strategy might also depend on the specific product or particular behavior. A car, among others, lends itself better for a strategy that tunes-in to status motives as opposed to furniture, since a car is already seen as a status product (Steg, 2005). Also, a water bottle such as Dopper[14], which is not necessarily a status product, would still be suitable for status motives, as people can display it to others. Sustainable food lends itself better for highlighting its immediate benefits, such as taste and freshness, compared to a more sustainable produced mobile phone, as such a product has no clear immediate benefits over those of a non-sustainable produced phone.

It is also of concern, which specific form of sustainable behavior is promoted by policy makers or marketers. Deconsumption lends itself better for self-interest motives, as it saves money, and may not be effective for status motives, as status generally is derived from possessions (Sundie et al., 2010; Veblen, 1899). On the other hand, sustainable offline shopping behavior is well suited for status motives, as people are in public, displaying their behavior. The online environment provides many opportunities for running sustainable competitions.[15] Also waste reduction and energy saving behavior can be promoted by means of competition, which already have proven to be effective in sustainability campaigns.[10,16]

Finally, these strategies are not mutually exclusive, and the most successful approach to promote sustainable behavior might involve a combination of several strategies. Displaying sustainable behavior for relative status benefits might work best when displayed to people that are of relevance to the individual. For instance, providing the opportunity to publicly display sustainable behavior in a way that potential mates or ingroup members see it, as opposed to the general public, could even further increase the already positive effect of status motives on people's sustainable behavior. Additionally, emphasizing immediate as opposed to future benefits works probably even better when these benefits are also of self-interest to the target audience. Hence, marketers could try to emphasize the immediate benefits of sustainable behavior for the targeted individual, instead of emphasizing the immediate benefits of sustainable behavior for people living in a different country, animals, or the world in general.

Future research directions

This dissertation was built upon several premises – derived from evolutionary theory – that could foster sustainable behavior. In doing so, it provided empirical evidence to the idea that harnessing ancestral roots can promote sustainability and therefore be a step up to the growth of a sustainable world. Since an evolutionary perspective has not often been studied in previous sustainability research, there is a big opportunity for future research to fill up this gap. In this section I propose several ideas for future research about how humans' innate motives can be used to promote sustainable behavior: (1) tapping into fundamental human motives, such as self-protection, disease avoidance, affiliation, mate-acquisition, and parenting, (2) making use of the power of leadership and the crowd, and (3) exploring the phenomena of deconsumption and the sharing economy and which ancestral motives could help or hinder people to consume less.

Fundamental human motives

Evolutionary psychology scholars acknowledge seven fundamental human motives: (1) self-protection, (2) disease avoidance, (3) affiliation, (4) status, (5) mate acquisition, (6) mate retention, and (7) parenting (Griskevicius & Kenrick, 2013; Kenrick et al., 2010). It would be of great interest to explore whether these motives could potentially be used as strategies to foster sustainable behavior. By tapping into the self-protection motive for instance, future research could test whether highlighting the risks of non-sustainable behavior for oneself, such as increasing frequency of floods, could foster sustainable behavior. In the context of diminishing pollution, future research can think of harnessing people's motivation to avoid diseases, and for example emphasize the importance of reducing litter as it could lead to health problems. In both of the latter examples one must keep in mind that people disregard problems they cannot see or feel (Griskevicius et al., 2012). Hence, it is important that the threats to the self and disease-related threats are relevant to the individual. Finally, tapping into the affiliation and mate acquisition motive, future research can investigate whether making

sustainability trendy or sexy could boost people's sustainable actions, as it might lead to being popular among friends and attractive for mates.

Another relevant line of research – that could complement the previous – would be to examine which fundamental motive fits a particular life stage best in order to promote sustainable behavior. This is highly relevant for sustainable marketers and policy makers, as it is easy to create customer segmentations based on these life stages. Previous research already showed that priming legacy motives (related to old age) increases sustainable behavior (Zaval, Markowitz, & Weber, 2015). Future research could, for instance, look at the usefulness of social norms and group identity in promoting sustainable behavior among adolescents, as the need to belong to peers (i.e., affiliation motive) is highly important at this life stage (Bigelow & La Gaipa, 1975). Young adults are in general highly driven by mate acquisition motives (Gleitman, Reisberg, & Gross, 2007). Hence, making sustainability "sexy" or attractive for mating might be a worthwhile strategy for the promotion of sustainable behavior for this age group. On the other hand, adults with a family life (i.e., having the responsibility to take care of one or more children) have generally strong parenting motives. Strategies to foster sustainable behavior during this life stage, therefore should focus on caring for kin. Future research is needed to test whether these types of strategies indeed work best for each particular life stage.

The power of the leader and the crowd

People are also predisposed to follow individuals who are perceived as leaders (i.e., those who are prestigious or successful) as well as the crowd (Griskevicius et al., 2012; Van Vugt et al., 2008). It is therefore of interest to look at the power of the leader and the crowd for the promotion of sustainable behavior. Research has shown that leader characteristics influence people's sustainable behavior, with younger leaders being more influential in exploring renewable resources and older leaders being more influential in conserving existing resources (Spisak, Grabo, Arvey, & Van Vugt, 2014). This is one of the first attempts to study sustainable leadership, indicating that there is a serious gap in the literature which future research can explore. With important research questions, such as, which characteristics (e.g., gender and height), negotiation

style (e.g., dovish or hawkish; Aaldering & De Dreu, 2012), or leadership style (e.g., interpersonally or task-oriented, democratically or autocratically; Eagly & Johnson, 1990) would lead to a more impactful sustainable leader.

Evolutionary scholars have shown that being male, having a tall stature and/or masculine facial cues is positively related to (perceived) leadership (Blaker, Rompa, Dessing, Vriend, Herschberg, & Van Vugt, 2013; Buss, 1999; Re, DeBruine, Jones, & Perrett, 2013). However, would these leaders also be more successful if they lead a sustainable company? In the stereotype content model warmth and competence are found to be universal dimensions that characterize the perception of different social groups and individuals (Fiske, Cuddy, Glick, & Xu, 2002) found that. Since sustainability is related to the warmth dimension (Antonetti & Maklan, 2016), the success of the evolved leadership features is not at all clear, as these features are related more to the competence dimension and less to the warmth dimension (Todorov, Mandisodza, Goren, & Hall, 2005). In a first attempt, I looked at the role of company (sustainable vs. non-sustainable) and its leader's gender (male vs. female) on people's attitude toward the company, measured by the perceived competence and warmth of the leader. Results of an experimental lab study showed that there was a main effect of company on warmth ($F(1, 170) = 10.57$, $p = .001$), but not on competence ($F(1, 170) = 0.53$, $p = .82$). The leader of an oil company was perceived as less warm ($M = 4.08$, $SD = 0.93$), compared to the leader of a solar panel company ($M = 4.54$, $SD = 0.98$). This main effect seems to be driven by the leader's gender, as a male leader of an oil company is perceived as less warm ($M = 3.87$, $SD = 0.93$) as opposed to a male leader of a sustainable company ($M = 4.50$, $SD = 0.73$; $F(1, 170) = 9.49$, $p = .002$), whereas no difference in perceived warmth was found for female leaders ($F(1, 170) = 2.27$, $p = .13$). This indicates that type of company and gender interact and influences the perceived warmth of the leader. Future research could investigate whether these differences could affect the adoption of sustainable initiatives in the firm by employees or organizational units and consumer behavior (i.e., purchases and company valuation).

Another important research angle is to look at the role of the crowd. Citizen initiatives, such as community gardening[17] and keeping neighborhoods clean[18], as well as crowdfunding, are growing phenomena. For instance, the volume of global

crowdfunding platforms increased from $597 million in 2014 to $739 million in 2016.[19] It is of great interest to investigate how people can be motivated to join sustainable initiatives and invest in sustainable crowdfunding projects. In a pilot study I found that negative message framing ("North sea in need, ghost nets asphyxiate") in a non-profit crowdfunding project yields higher donations when funds are far from their funding goal (M = 0.75 euro, SD = 0.95) as opposed to close to their funding goal (M = 0.59 euro; SD = 0.49; $F(1, 326) = 8.01$, $p = .01$). On the other hand, positive message framing ("A clean north sea, free from ghost nets") yields higher donations when funds are close to their funding goal (M = 0.83 euro, SD = 0.53) as opposed to far from their funding goal (M = 0.63 euro, SD = 0.51; $F(1, 326) = 3.56$, $p = .06$). This indicates that at the early stage of the crowdfunding it is better to use a negative frame type description of the crowdfunding project to attract donations, whereas at a later stage of the crowdfunding a positive frame type of the project attracts more donations.

Deconsumption

It is of utmost importance to find ways to make people consume less, as the consumption pattern that people display (particularly in Western countries) puts tremendous pressure on our planet (WWF, 2012). Think for example about the number of flights people make. The passengers that were carried via air transport worldwide increased from 2.25 billion in 2009 to 3.70 billion in 2016 (i.e., more than 64% in 8 years) and is today part of normal consumption patterns.[20] This is a concerning trend, as it has a meaningful impact on CO_2 levels in the atmosphere (Scholl et al., 1996). However, decreasing people's consumption is easier said than done, as deconsumption strikes with multiple ancestral motives, such as status motives (i.e., people display their status with possessions) and the motive to follow the social norm (i.e., most people fly to far destinations for a holiday). Accordingly, Grinstein and Nisan (2009) state that deconsumption is in particular a difficult challenge for marketers and policy makers. Thus far, most research in the sustainability realm, including this dissertation, is looking at how to increase people's consumption of sustainable products over non-sustainable ones. Hence, future research should try to find ways how to reduce these consumption patterns even though this might be challenging.

One potential strategy that could work might be the usage of nature scenery. Nature, especially lush landscapes, has been related to a sense of abundance (e.g., Van der Wal et al., 2013). Hence, this sense of abundance might reduce the need to consume. Future research can test this, by looking at the effect of a natural environment (lush green versus barren landscapes) on people's consumption patterns in comparison to an urban environment. Another alternative that future research could investigate is what role sharing economy could play, as sharing is a way to deconsume. For instance, the sharing economy might yield self-interest benefits as it makes consumption cheaper. Moreover, it might strengthen group identity as it represents smaller and more interdependent communities resembling ancestral groups, which could foster sustainable behavior (Griskevicius et al., 2012). A potentially valuable example and interesting form of sharing economy in the Netherlands is Vandebron[21], that make it possible for people to use electricity that is produced by other local citizens (mostly farmers), and SnappCar[22], who make it possible for people to share their car with others. Worldwide established examples are Airbnb[23] and Uber[24], which already operate from 2008 and 2009, respectively.

To conclude

This dissertation was set out to provide novel solutions that could contribute to the sustainability problem by narrowing the sustainable intention-behavior gap. Building on evolutionary theory and the premise that harnessing people's ancestral roots could help foster sustainable behavior (Griskevicius et al., 2012), this dissertation empirically tested and showed that matching strategies to promote sustainable behavior with humans' (1) self-interested nature, (2) relative status motives, (3) temporal myopia, and (4) biophilia, made people act more sustainably. More importantly, these findings resulted in a set of valuable and relatively easy to implement strategies for practitioners – such as policy makers, responsible marketers of for-profit and non-profit organizations – that wish to promote sustainable behavior. Overall, I hope this dissertation contributes to the growth of a more sustainable world.

Footnotes

1 Four participants indeed won the 25 euros. Each of them received the amount of money they wanted to keep for themselves and the rest of the money was donated to WWF.

2 Due to limited availability of participants in the behavioral lab the study was run in three waves. Results including wave are the following: a significant main effect of condition, $F(1, 322) = 9.67$, $p < .01$, a marginal significant main effect of SVO, $F(1, 322) = 3.14$, $p = .08$, a significant main effect of wave, $F(2, 322) = 20.27$, $p < .001$, a significant interaction effect between condition and SVO, $F(1, 322) = 8.45$, $p < .01$, an insignificant interaction between wave and condition ($F(2, 322) = 1.94$, $p = .15$) and an insignificant three-way interaction between wave, condition, and SVO ($F(2, 322) = 1.64$, $p = .20$).

3 CO_2 fit is an app to reduce CO_2 emissions by means of competition (http://techcrunch.com/2015/01/05/why-im-excited-by-the-new-co2-fit-app-an-app-to-get-the-planet-fit/).

4 Entente Florale Europe is a competition for being the greenest city or village within Europe (http://www.entente-florale.eu/).

5 Shower With Friends is an app that uses competition among friends in order to reduce water consumption (http://techcrunch.com/2014/09/07/shower-with-friends-lets-you-gamify-water-consumption/).

6 Price range of the candle was derived from https://www.ecozo.nl/nl/fairtrade-stompkaars-7-5-cm.

7 Price range of the copy paper was derived from https://www.amazon.com/ Hammermill-Digital-Letter-Bright-102467R/dp/B00 006IDP3.

8 Since product evaluation is based on the accompanied message frame, it is strongly language sensitive. Therefore, participants with a bad or very bad level of proficiency in English (N = 3) were excluded from the analyses. Results for the interaction effect of condition and message frame on sustainable attitudes including all participants were: $F(1, 160) = 2.63$, $p = .11$.

9 Green Product Award is an annual international competition for sustainable products and services from established firms and Start-ups (https://www.gp-award.com/en).

10 Klimaatstraatfeest is an energy reduction competition between households of different streets sponsored by different non-governmental organizations (http://klimaatstraatfeest.nl/).

11 The aim of the recycling game is to become the best recycler (http://www.greenboardeducation.com/game/recycle).

12 Down Jones Sustainability Index ranks companies on their sustainability practices (http://www.sustainability-indices.com/).

13 Tesla builds full electric cars which are highly attractive to upper class customers (http://tesla.com/).

14 Dopper is a durable and reusable water bottle (https://dopper.com/).

15 Matthew Barby provides The Ultimate Guide to Running Online Competitions with instructions and many platforms and websites that can be used for running online competitions (https://www.matthewbarby.com/running-online-competitions/).

16 Kill the Cup is a Green Grants sponsored campaign at University of California, San Diego, conducted by six MBA students at UCSD's Rady School of Management in conjunction with UCSD Housing, Dining, & Hospitality (http://www.killthecup.org/).

17 American Community Garden Association supports community gardening and greening across the United States and Canada (https://communitygarden.org/).

18 NederlandSchoon is a foundation that wants to prevent and combat litter waste in the Netherlands. People can become a “Supporter van Schoon” and join organized activities or set-up activities by themselves (https://www.nederlandschoon.nl/).

19 The total crowdfunding volume worldwide was derived from https://www.statista.com/statistics/620952/total-crowdfunding-volume-worldwide/.

20 The numbers of passengers that were carried via air transport worldwide were derived from https://data.worldbank.org/indicator/IS.AIR.PSGR.

21 Vandebron is an energy service provider that makes it possible for people to use electricity from local energy producers (https://vandebron.nl/).

22 SnappCar is an online marketplace that facilitates lease or rent privately owned cars (https://www.snappcar.nl/).

23 Airbnb is a company which operates an online marketplace and hospitality service for people to lease or rent short-term privately owned lodging (https://www.airbnb.com/).

24 Uber is an online marketplace that mediates between travelers and providers of passenger transport (https://www.uber.com/).

References

Aaldering, H., & De Dreu, C. K. W. (2012). Why hawks fly higher than doves: Intragroup conflict in representative negotiation. *Group Processes & Intergroup Relations, 15*, 713-724.

Allison, S. T., Beggan, J. K., & Midgley, E. H. (1996). The quest for "similar instances" and "simultaneous possibilities": Metaphors in social dilemma research. *Journal of Personality and Social Psychology, 71*, 479-497.

Allnutt, T. F., Ferrier, S., Manion, G., Powell, G. V., Ricketts, T. H., Fisher, B. L., ... & Lees, D. C. (2008). A method for quantifying biodiversity loss and its application to a 50-year record of deforestation across Madagascar. *Conservation Letters, 1*, 173-181.

Andreoni, J., & Sprenger, C. (2012). Risk preferences are not time preferences. *The American Economic Review, 102*, 3357-3376.

Antonetti, P., & Maklan, S. (2016). Hippies, greenies, and tree huggers: How the "warmth" stereotype hinders the adoption of responsible brands. *Psychology & Marketing, 33*, 796-813.

Arkin, R. M., Oleson, K. C., & Carroll, P. J. (2013). *Handbook of the uncertain self*. New York: Psychology Press.

Au, W., & Kwong, J. Y. Y. (2004). Measurement and effects of social value orientation in social dilemmas: A review. In R. Suleiman, D. Budescu, I. Fischer, & D. Messick (Eds.), *Contemporary psychological research on social dilemmas* (pp. 71-98). Cambridge: Cambridge University Press.

Bagwell, L. S., & Bernheim, B. D. (1996). Veblen effects in a theory of conspicuous consumption. *The American Economic Review, 86*, 349-373.

Balliet, D., & Joireman, J. (2010). Ego depletion reduces pro-selves' concern with the wellbeing of others. *Group Processes & Intergroup Relations, 13*, 227-239.

Balliet, D., Parks, C., & Joireman, J. (2009). Social value orientation and cooperation in social dilemmas: A meta-analysis. *Group Processes & Intergroup Relations, 12*, 533-547.

Barrett, L., Dunbar, R., & Lycett, J. (2002). *Human evolutionary psychology*. London: Palgrave Macmillan.

Barrett, H. C., & Kurzban, R. (2006). Modularity in cognition: Framing the debate. *Psychological Review, 113*, 628-647.

BenDor, T., Scheffran, J., & Hannon, B. (2009). Ecological and economic sustainability in fishery management: A multi-agent model for understanding competition and cooperation. *Ecological Economics, 68*, 1061-1073.

Bennett, V. M., Pierce, L., Snyder, J. A., & Toffel, M. W. (2013). Customer-driven misconduct: How competition corrupts business practices. *Management Science, 59*, 1725-1742.

Berman, M. G., Kross, E., Krpan, K. M., Askren, M. K., Burson, A., Deldin, P. J., … Jonides, J. (2012). Interacting with nature improves cognition and affect for individuals with depression. *Journal of Affective Disorder, 140*, 300-305.

Bhuiyan, M. A., Jabeen, M., Zaman, K., Khan, A., Ahmad, J., & Hishan, S. S. (2018). The impact of climate change and energy resources on biodiversity loss: Evidence from a panel of selected Asian countries. *Renewable Energy, 117*, 324-340.

Biesbroek, G. R., Swart, R. J., Carter, T. R., Cowan, C., Henrichs, T., Mela, H., ... & Rey, D. (2010). Europe adapts to climate change: Comparing national adaptation strategies. *Global Environmental Change, 20*, 440-450.

Bigelow, B. J., & La Gaipa, J. J. (1975). Children's written descriptions of friendship: A multidimensional analysis. *Developmental Psychology, 11*, 857-858.

Biggs, D., Courchamp, F., Martin, R., & Possingham, H. P. (2013). Legal trade of Africa's rhino horns. *Science, 339*, 1038-1039.

Blake, J. (1999). Overcoming the 'value-action gap' in environmental policy: Tensions between national policy and local experience. *Local Environment, 4*, 257-278.

Blaker, N. M., Rompa, I., Dessing, I. H., Vriend, A. F., Herschberg, C., & Van Vugt, M. (2013). The height leadership advantage in men and women: Testing evolutionary psychology predictions about the perceptions of tall leaders. *Group Processes & Intergroup Relations, 16*, 17-27.

Bogaert, S., Boone, C., & Declerck, C. (2008). Social value orientation and cooperation in social dilemmas: A review and conceptual model. *British Journal of Social Psychology, 47*, 453-480.

Bohle, H. G., Downing, T. E., & Watts, M. J. (1994). Climate change and social vulnerability: Toward a sociology and geography of food insecurity. *Global Environmental Change, 4*, 37-48.

Botkin, D. B., & Keller, E. A. (2010). *Environmental science: Earth as a living planet* (7th ed.). New York: Wiley & Sons, Inc.

Buss, D. M. (1999). *Evolutionary psychology: The new science of the mind.* Boston: Allyn & Bacon.

Buss, D. M. (2009). How can evolutionary psychology successfully explain personality and individual differences? *Perspectives on Psychological Science, 4*, 359-366.

Cameron, L. D., Brown, P. M., & Chapman, J. G. (1998). Social value orientations and decisions to take proenvironmental action. *Journal of Applied Social Psychology, 28*, 675-697.

Capellán-Pérez, I., Mediavilla, M., de Castro, C., Carpintero, Ó., & Miguel, L. J. (2014). Fossil fuel depletion and socio-economic scenarios: An integrated approach. *Energy, 77*, 641-666.

Carlson, K. M., Curran, L. M., Ratnasari, D., Pittman, A. M., Soares-Filho, B. S., Asner, G. P., ... & Rodrigues, H. O. (2012). Committed carbon emissions, deforestation, and community land conversion from oil palm plantation expansion in West Kalimantan, Indonesia. *Proceedings of the National Academy of Sciences, 109*, 7559-7564.

Casado-Asensio, J., & Steurer, R. (2014). Integrated strategies on sustainable development, climate change mitigation and adaptation in Western Europe: Communication rather than coordination. *Journal of Public Policy, 34*, 437-473.

CBS (2011). *Demografische kerncijfers per Gemeente 2011*. Retrieved from https://www.cbs.nl/nl-nl/publicatie/2011/48/demografische-kerncijfers-per gemeente-2011.

Chandon, P., Wansink, B., & Laurent, G. (2000). A benefit congruency framework of sales promotion effectiveness. *Journal of Marketing, 64*, 65-81.

Chartrand, T. L., & Van Baaren, R. (2009). Human mimicry. *Advances in Experimental Social Psychology, 41*, 219-274.

Chisholm, J. S., Ellison, P. T., Evans, J., Lee, P. C., Lieberman, L. S., Pavlik, Z., ... & Worthman, C. M. (1993). Death, hope, and sex: Life-history theory and the development of reproductive strategies. *Current Anthropology, 34*, 1-24.

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology, 55*, 591-621.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology, 58*, 1015-1026.

Clayton, S., Devine-Wright, P., Stern, P. C., Whitmarsh, L., Carrico, A., Steg, L., ... & Bonnes, M. (2015). Psychological research and global climate change. *Nature Climate Change, 5*, 640-646.

Colarelli, S. M., & Dettmann, J. R. (2003). Intuitive evolutionary perspectives in marketing practices. *Psychology & Marketing, 20*, 837-865.

Connelly, B. L., Tihanyi, L., Crook, T. R., & Gangloff, K. A. (2014). Tournament theory: Thirty years of contests and competitions. *Journal of Management, 40*, 16-47.

Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*, 245-265.

Csutora, M. (2012). One more awareness gap? The behaviour–impact gap problem. *Journal of Consumer Policy, 35*, 145-163.

Daase, C., & Kessler, O. (2007). Knowns and unknowns in the 'war on terror': Uncertainty and the political construction of danger. *Security Dialogue, 38*, 411-434.

Das, E., Bushman, B. J., & Ardensen, J. (2010). *Feeling alive without spending a dime: Life and death salience exert opposite effects on worldview defense and consumption patterns.* Unpublished manuscript, Radboud University, Nijmegen, The Netherlands.

De Cremer, D., & Van Dijk, E. (2002). Reactions to group success and failure as a function of identification level: A test of the goal-transformation hypothesis in social dilemmas. *Journal of Experimental Social Psychology, 38*, 435-442.

De Kwaadsteniet, E. W., Van Dijk, E., Wit, A., & De Cremer, D. (2006). Social dilemmas as strong versus weak situations: Social value orientations and tacit coordination under resource size uncertainty. *Journal of Experimental Social Psychology, 42*, 509-516.

Deleersnyder, B., Dekimpe, M. G., Sarvary, M., & Parker, P. M. (2004). Weathering tight economic times: The sales evolution of consumer durables over the business cycle. *Quantitative Marketing and Economics, 2*, 347-383.

Diamond, J. (2005). *Collapse: How societies choose to fail or succeed*. London: Penguin.

Dietz, T., Ostrom, E., & Stern, P.C. (2003). The struggle to govern the commons. *Science, 302*, 1907-1912.

Duckworth, A. L., & Kern, M. L. (2011). A meta-analysis of the convergent validity of self-control measures. *Journal of Research in Personality, 45*, 259-268.

Eagly, A. H., & Johnson, B. T. (1990). Gender and leadership style: A meta-analysis. *Psychological Bulletin, 108*, 233-256.

Eek, D., & Gärling, T. (2006). Prosocials prefer equal outcomes to maximizing joint outcome. *British Journal of Social Psychology, 45*, 321-337.

Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk. *Human Nature, 20*, 204-268.

Ellis, B. J., & Garber, J. (2000). Psychosocial antecedents of variation in girls' pubertal timing: Maternal depression, stepfather presence, and marital and family stress. *Child Development, 71*, 485-501.

Ellsberg, D. (1961). Risk, ambiguity, and the Savage axioms. *Quarterly Journal of Economics, 75*, 643-669.

Engelhard, N. P., Van der Wal, A. J., & Van Vugt, M. (2013). Competitief altruïsme op de werkvloer: Een evolutionair psychologische benadering. [Competitive altruism at work: An evolutionary psychology approach]. *Gedrag & Organisatie, 26*, 293-310.

Esses, V. M., Medianu, S., & Lawson, A. S. (2013). Uncertainty, threat, and the role of the media in promoting the dehumanization of immigrants and refugees. *Journal of Social Issues, 69*, 518-536.

Faber Taylor, A., Kuo, F. E., & Sullivan, W. C. (2002). Views of nature and self-discipline: Evidence from inner city children. *Journal of Environmental Psychology, 22*, 49-63.

Fahr, R., & Janssen, E. A. (2014). *The wage effects of social norms. Evidence of deviations from peers' body mass in Europe*. Unpublished manuscript, University of Paderborn, Paderborn, Germany.

Faraji-Rad, A., & Pham, M. T. (2016). Uncertainty increases the reliance on affect in decisions. *Journal of Consumer Research, 44*, 1-21.

Feldman, M. W., & Laland, K. N. (1996). Gene-culture coevolutionary theory. *Trends in Ecology & Evolution, 11*, 453-457.

Figner, B., Knoch, D., Johnson, E. J., Krosch, A. R., Lisanby, S. H., Fehr, E., & Weber, E. U. (2010). Lateral prefrontal cortex and self-control in intertemporal choice. *Nature Neuroscience, 13*, 538-539.

Fiske, S. T., Cuddy, A. J. C., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology, 82*, 878-902.

Fitzsimons, G. J. (2008). Death to dichotomizing. *Journal of Consumer Research, 35*, 1-4.

Fox, C. R., & Ulkümen, G. (2011). Distinguishing two concepts of uncertainty. In W. Brun, G. Keren, G. Kirkebøen, & H. Montgomery (Eds.), *Perspectives on thinking, judgment, and decision making* (pp. 21-35). Oslo: Universitetsforlaget.

Fredrick, S., Loewenstein, G., & O'Donoghue, T. (2001). Time discounting and time preference: A critical review. *Journal of Economic Literature, 40*, 351-401.

Gardner, G. T., & Stern, P. C. (2002). *Environmental problems and human behavior* (2nd ed.). Boston: Pearson Custom Publishing.

Gärling, T., Fujii, S., Gärling, A., & Jakobsson, C. (2003). Moderating effects of social value orientation on determinants of proenvironmental behavior intention. *Journal of Environmental Psychology, 23*, 1-9.

Geels, F. W. (2013). The impact of the financial-economic crisis on sustainability transitions: Financial investment, governance and public discourse. *Environmental Innovation and Societal Transitions, 6*, 67-95.

Gleitman, H., Reisberg, D., & Gross, J. (2007). *Psychology* (7th ed.). New York: Norton & Company, Inc.

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research, 35*, 472-482.

Graedel, T. E., Harper, E. M., Nassar, N. T., & Reck, B. K. (2015). On the materials basis of modern society. *Proceedings of the National Academy of Sciences, 112*, 6295-6300.

Green, L., & Myerson, J. (2004). A discounting framework for choice with delayed and probabilistic rewards. *Psychological Bulletin, 130*, 769-792.

Greenpeace (2017, October 23). *No fish, no future!* Retrieved from http://www.greenpeace.org/eastasia/multimedia/photos/oceans/no-fish-no-future/

Gregory, P. J., Ingram, J. S., & Brklacich, M. (2005). Climate change and food security. *Philosophical Transactions of the Royal Society of London B: Biological Sciences, 360*, 2139-2148.

Grinstein, A., & Nisan, U. (2009), Demarketing, minority groups, and national attachment. *Journal of Marketing, 73*, 105-122.

Griskevicius, V., Ackerman, J. A., Cantú, S. M., Delton, A. W., Robertson, T. E., Simpson, J. A., ... & Tybur, J. M. (2013). When the economy falters, do people spend or save? Responses to resource scarcity depend on childhood environment. *Psychological Science, 24*, 197-205.

Griskevicius, V., Cantú, S. M., & Van Vugt, M. (2012). The evolutionary bases for sustainable behavior: Implications for marketing, policy, and social entrepreneurship. *Journal of Public Policy & Marketing, 31*, 115-128.

Griskevicius, V., Delton, A. W., Robertson, T. E., & Tybur, J. M. (2011). Environmental contingency in life history strategies: The influence of mortality and socioeconomic status on reproductive timing. *Journal of Personality and Social Psychology, 100*, 241-254.

Griskevicius, V., Goldstein, N. J., Mortensen, C. R., Cialdini, R. B., & Kenrick, D. T. (2006). Going along versus going alone: When fundamental motives facilitate strategic (non) conformity. *Journal of Personality and Social Psychology, 91*, 281-294.

Griskevicius, V., & Kenrick, D. T. (2013). Fundamental motives: How evolutionary needs influence consumer behavior. *Journal of Consumer Psychology, 23*, 372-386.

Griskevicius, V., Tybur, J. M., Delton, A. W., & Robertson, T. E. (2011). The influence of mortality and socioeconomic status on risk and delayed rewards: A life history theory approach. *Journal of Personality and Social Psychology, 100*, 1015-1026.

Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology, 98*, 392-404.

Guéguen, N., & Stefan, J. (2014). "Green altruism": Short immersion in natural environments and helping behaviour. *Environment and Behavior, 48*, 324-342.

Gustafsson, M., Biel, A., & Gärling, T. (1999). Overharvesting of resources of unknown size. *Acta Psychologica, 103*, 47-64.

Halevy, Y. (2008). Strotz meets Allais: Diminishing impatience and the certainty effect. *American Economic Review, 98*, 1145-1162.

Halicioglu, F. (2009). An econometric study of CO_2 emissions, energy consumption, income and foreign trade in Turkey. *Energy Policy, 37*, 1156-1164.

Hansen, M. C., Stehman, S. V., Potapov, P. V., Arunarwati, B., Stolle, F., & Pittman, K. (2009). Quantifying changes in the rates of forest clearing in Indonesia from 1990 to 2005 using remotely sensed data sets. *Environmental Research Letters, 4*: 034001.

Hantula, D. A. (2003). Guest editorial: Evolutionary psychology and consumption. *Psychology & Marketing, 20*, 757-763.

Hardin, G. (1968). The tragedy of the commons. *Science, 162*, 1243-1248.

Hardy, C., & Van Vugt, M. (2006). Nice guys finish first: The competitive altruism hypothesis. *Personality and Social Psychology Bulletin, 32*, 1402-1413.

Harper, G. J., Steininger, M. K., Tucker, C. J., Juhn, D., & Hawkins, F. (2007). Fifty years of deforestation and forest fragmentation in Madagascar. *Environmental Conservation, 34*, 325-333.

Hartig, T., Evans, G. W., Jamner, L. D., Davis, D. S., & Gärling, T. (2003). Tracking restoration in natural and urban field settings. *Journal of Environmental Psychology, 23*, 109-123.

Hill, S. E., Rodeheffer, C. D., Griskevicius, V., Durante, K., & White, A. E. (2012). Boosting beauty in an economic decline: Mating, spending, and the lipstick effect. *Journal of Personality and Social Psychology, 103*, 275-291.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of Environmental Education, 18*, 1-8.

Iredale, W., Van Vugt, M., & Dunbar, R. (2008). Showing off in humans: Male generosity as a mating signal. *Evolutionary Psychology, 6*, 386-392.

Jackson, T. (2005). Motivating sustainable consumption: A review of evidence on consumer behaviour and behavioural change. *Energy & Environment, 15*, 1027-1051.

Joireman, J., Lasane, T. P., Bennett, J., Richards, D., & Solaimani, S. (2001). Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour. *British Journal of Social Psychology, 40*, 133-155.

Joireman, J. A., Van Lange, P. A. M., & Van Vugt, M. (2004). Who cares about the environmental impact of cars? Those with an eye toward the future. *Environment and Behavior, 36*, 187-206.

Joye, Y., & Bolderdijk, J. W. (2015). An exploratory study into the effects of extraordinary nature on emotions, mood, and prosociality. *Frontiers in Psychology, 5*: 1577.

Kahneman, D., & Tversky, A. (1982). Variants of uncertainty. *Cognition, 11*, 143-157.

Kalra, A., & Shi, M. (2001). Designing optimal sales contests: A theoretical perspective. *Marketing Science, 20*, 170-193.

Kamakura, W. A., & Du, R. Y. (2012). How economic contractions and expansions affect expenditure patterns. *Journal of Consumer Research, 39*, 229-247.

Kameda, T., Takezawa, M., & Hastie, R. (2003). The logic of social sharing: An evolutionary game analysis of adaptive norm development. *Personality and Social Psychology Review, 7*, 2-19.

Kaplan S. (1987). Aesthetics, affect, and cognition: Environmental preference from an evolutionary perspective. *Environment and Behavior, 19*, 3-32.

Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology, 15*, 169-182.

Kaplan, H. S., & Gangestad, S. W. (2005). Life history theory and evolutionary psychology. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 68-95). New York: Wiley & Sons.

Karanikolos, M., Mladovsky, P., Cylus, J., Thomson, S., Basu, S., Stuckler, D., ... & McKee, M. (2013). Financial crisis, austerity, and health in Europe. *The Lancet, 381*, 1323-1331.

Karmarkar, U. R., & Bollinger, B. (2015). BYOB: How bringing your own shopping bags leads to treating yourself and the environment. *Journal of Marketing, 79*, 1-15.

Kasser, T., & Sheldon, K. M. (2000). Of wealth and death: Materialism, mortality salience, and consumption behavior. *Psychological Science, 11*, 348-351.

Kellert, S. R., & Wilson, E. O. (1993). *The biophilia hypothesis*. Washington DC: Island Press.

Kennedy, E. H., Beckley, T. M., McFarlane, B. L., & Nadeau, S. (2009). Why we don't "walk the talk": Understanding the environmental values/behaviour gap in Canada. *Human Ecology Review, 16*, 151-160.

Kenrick, D. T., Griskevicius, V., Neuberg, S. L., & Schaller, M. (2010). Renovating the pyramid of needs: Contemporary extensions built upon ancient foundations. *Perspectives on Psychological Science, 5*, 292-314.

Keren, G., & Roelofsma, P. (1995). Immediacy and certainty in intertemporal choice. *Organizational Behavior and Human Decision Processes, 63*, 287-297.

Kerfoot, B. P., & Kissane, N. (2014). The use of gamification to boost residents' engagement in simulation training. *JAMA Surgery, 149*, 1208-1209.

Kirby, K. N., Petry, N. M., & Bickel, W. K. (1999). Heroin addicts have higher discount rates for delayed rewards than non-drug-use controls. *Journal of Experimental Psychology: General, 128*, 78-87.

Klintman, M. (2013). *Citizen–consumers and evolution: Reducing environmental harm through our social motivation.* Basingstoke: Palgrave Macmillan.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*, 239-260.

Kotler, P. (2000). *Marketing management millennium edition* (10th ed.). New Jersey: Prentice-Hall, Inc.

Kronrod, A., Grinstein, A., & Wathieu, L. (2012). Go green! Should environmental messages be so assertive? *Journal of Marketing, 76*, 95-102.

Kulak, M., Graves, A., & Chatterton, J. (2013). Reducing greenhouse gas emissions with urban agriculture: a life cycle assessment perspective. *Landscape and Urban Planning, 111*, 68-78.

Lamey, L., Deleersnyder, B., Dekimpe, M. G., & Steenkamp, J. B. E. M. (2007). How business cycles contribute to private-label success: Evidence from the United States and Europe. *Journal of Marketing, 71*, 1-15.

Leary, M. R. (1999). Making sense of self-esteem. *Current Directions in Psychological Science, 8*, 32-35.

Leary, M. R., Tambor, E. S., Terdal, S. K., & Downs, D. L. (1995). Self-esteem as an interpersonal monitor: The sociometer hypothesis. *Journal of Personality and Social Psychology, 68*, 518-530.

Lederbogen, F., Kirsch, P., Haddad, L., Streit, F., Tost, H., Schuch, P., … Meyer-Lindenberg, A. (2011). Urban living and urban upbringing affect neural social stress processing in humans. *Nature, 474*, 498-501.

Lee, N. C., Krabbendam, L., Dekker, S., Boschloo, A., De Groot, R., & Jolles, J. (2012). Academic motivation mediates the influence of temporal discounting on academic achievement during adolescence. *Trends in Neuroscience and Education, 1*, 43-48.

Leiserowitz, A. A. (2005). American risk perceptions: Is climate change dangerous? *Risk Analysis, 25*, 1433-1442.

Levensmiddelenkrant (2012). *AH wil plastic tasjes uitbannen*. Retrieved from http://www.levensmiddelenkrant.nl/nieuws/algemeen/ah-wil-plastic-tasjes-uitbannen.

Li, Y., Johnson, E.J., Zaval, L., 2011. Local warming daily temperature change influences belief in global warming. *Psychological Science, 22*, 454-459.

Liberman, N., & Trope, Y. (2008). The psychology of transcending the here and now. *Science, 322*, 1201-1205.

Lim, N. (2010). Social loss aversion and optimal contest design. *Journal of Marketing Research, 47*, 777-787.

Lipshitz, R., & Strauss, O. (1997). Coping with uncertainty: A naturalistic decision-making analysis. *Organizational Behavior and Human Decision Processes, 69*, 149-163.

Liu, D., Geng, X., & Whinston, A. B. (2007). Optimal design of consumer contests. *Journal of Marketing, 71*, 140-155.

Luchs, G. M., Naylor, R. W., Irwin, J. R., & Raghunathan, R. (2010). The sustainability liability: Potential negative effects of ethicality on product preference. *Journal of Marketing, 74*, 18-31.

Lynch, J. G., Bradlow, E. T., Huber, J. C., & Lehmann, D. R. (2015). Reflections on the replication corner: In praise of conceptual replications. *International Journal of Research in Marketing, 32*, 333-342.

Maas, J., Verheij, R. A., Groenewegen, P. P., De Vries, S., & Spreeuwenberg, P. (2006). Green space, urbanity, and health: How strong is the relation? *Journal of Epidemiology and Community Health, 60*, 587-592.

Maslow, A.H. (1943). A theory of human motivation. *Psychological Review, 50*, 370-396.

Mayer, N. (2013). From Jean-Marie to Marine Le Pen: Electoral change on the far right. *Parliamentary Affairs, 66*, 160-178.

Mayer, F. S., Frantz, C. M., Bruehlman-Senecal, E., & Dolliver, K. (2009). Why is nature beneficial? The role of connectedness to nature. *Environment and Behavior, 41*, 607-643.

Mayer, J. D., & Gaschke, Y. N. (1988). The experience and meta-experience of mood. *Journal of Personality and Social Psychology, 55*, 102-111.

Mazar, N., & Zhong, C. B. (2010). Do green products make us better people? *Psychological Science, 21*, 494-498.

McClintock, C. G., & Allison, S. T. (1989). Social value orientation and helping behavior. *Journal of Applied Social Psychology, 19*, 353-362.

McGranahan, G., Balk, D., & Anderson, B. (2007). The rising tide: Assessing the risks of climate change and human settlements in low elevation coastal zones. *Environment and Urbanization, 19*, 17-37.

McMahan, E. A., & Estes, D. (2015). The effect of contact with natural environments on positive and negative affect: A meta-analysis. *Journal of Positive Psychology, 10*, 507-519.

Meijers, M. H., Verlegh, P. W., Noordewier, M. K., & Smit, E. G. (2015). The dark side of donating: How donating may license environmentally unfriendly behavior. *Social Influence, 10*, 250-263.

Messick, D., & McClintock, C. (1968). Motivational bases of choice in experimental games. *Journal of Experimental Social Psychology, 4*, 1-25.

Milfont, T.L., Wilson, J. & Diniz, P. (2012) Time perspective and environmental engagement: A meta-analysis. *International Journal of Psychology, 47*, 325-334.

Milkman, K. L. (2012). Unsure what the future will bring? You may overindulge: Uncertainty increases the appeal of wants over shoulds. *Organizational Behavior and Human Decision Processes, 119*, 163-176.

Miller, G. F. (2007). Sexual selection for moral virtues. *Quarterly Review of Biology, 82*, 97-125.

Milliken, F. (1987). Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management Review, 12*, 133-143.

Moffitt, T. E., Caspi, A., Belsky, J., & Silva, P. A. (1992). Childhood experience and the onset of menarche: A test of a sociobiological model. *Child Development, 63*, 47-58.

Morren, M., & Grinstein, A. (2016). Explaining environmental behavior across borders: A meta-analysis. *Journal of Environmental Psychology, 47*, 91-106.

Murphy, R. O., Ackermann, K. A., & Handgraaf, M. (2011). Measuring social value orientation. *Judgment and Decision Making, 6*, 771-781

Nettle, D. (2006). The evolution of personality variation in humans and other animals. *American Psychologist, 61*, 622-631.

Nettle, D. (2010). Dying young and living fast: Variation in life history across English neighborhoods. *Behavioral Ecology, 21*, 387-395.

Neumayer, E. (2004). The environment, left-wing political orientation and ecological economics. *Ecological Economics, 51*, 167-175.

Nisbet, E. K., & Zelenski, J. M. (2011). Underestimating nearby nature: Affective forecasting errors obscure the happy path to sustainability. *Psychological Science, 22*, 1101-1106.

Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior, 41*, 715-740.

Nolan, J. M., Schultz, P. W., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2008). Normative social influence is underdetected. *Personality and Social Psychology Bulletin, 34*, 913-923.

Ornstein, R. E., & Ehrlich, P. R. (2000). *New world new mind: Moving toward conscious evolution.* Los Altos: ISHK.

Park, S. H., & Mattson, R. H. (2008). Effects of flowering and foliage plants in hospital rooms on patients recovering from abdominal surgery. *HortTechnology, 18*, 563-568.

Penn, D. (2003). The evolutionary roots of our environmental problems: Toward a darwinian ecology. *Quarterly Review of Biology, 78*, 275-301.

Peters, J., & Büchel, C. (2011). The neural mechanisms of inter-temporal decision making: Understanding variability. *Trends in Cognitive Science, 15*, 227-239.

Pham, M. T. (2013). The seven sins of consumer psychology. *Journal of Consumer Psychology, 23*, 411-423.

Phipps, M., Ozanne, L. K., Luchs, M. G., Subrahmanyan, S., Kapitan, S., Catlin, J., ... & Weaver, S. T. (2013). Understanding the inherent complexity of sustainable consumption: A social cognitive framework. *Journal of Business Research, 66*, 1227-1234.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879-891.

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Assessing moderated mediation hypotheses: Theory, methods and prescriptions. *Multivariate Behavioral Research, 42*, 185-227.

Rachlin, H., Logue, A. W., Gibbon, J., & Frankel, M. (1986). Cognition and behavior in studies of choice. *Psychological Review, 93*, 33-45.

Re, D. E., DeBruine, L. M., Jones, B. C., & Perrett, D. I. (2013). Facial cues to perceived height influence leadership choices in simulated war and peace contexts. *Evolutionary Psychology, 11*, 89-103.

Roberts, G. (1998). Competitive altruism: From reciprocity to the handicap principle. *Proceedings of the Royal Society of London, Series B, 265*, 427-431.

Rogelj, J., Den Elzen, M., Höhne, N., Fransen, T., Fekete, H., Winkler, H., ... & Meinshausen, M. (2016). Paris Agreement climate proposals need a boost to keep warming well below 2 C. *Nature, 534*, 631-639.

Saad, G. (2007). *The Evolutionary Bases of Consumption.* New Jersey: Lawrence Erlbaum Associations.

Saad, G. (2013). Evolutionary consumption. *Journal of Consumer Psychology, 23*, 351-371.

Saad, G., & Gill, T. (2000). Applications of evolutionary psychology in marketing. *Psychology & Marketing, 17*, 1005-1034.

Sanne, C. (2002). Willing consumers—Or locked-in? Policies for a sustainable consumption. *Ecological Economics, 42*, 273-287.

Scannell, L., & Gifford, R. (2013). Personally relevant climate change the role of place attachment and local versus global message framing in engagement. *Environment and Behavior, 45*, 60-85.

Scholl, L., Schipper, L., & Kiang, N. (1996). CO_2 emissions from passenger transport: A comparison of international trends from 1973 to 1992. *Energy Policy, 24*, 17-30.

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science, 18*, 429-434.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 25, pp. 1-65). San Diego: Academic Press.

Schwartz, S. H., & Sagiv, L. (1995). Identifying culture-specifics in the content and structure of values. *Journal of Cross–Cultural Psychology, 26*, 92-116.

Schwarz, N. (2002). Situated cognition and the wisdom of feelings: Cognitive tuning. In L. Feldman Barrett & P. Salovey (Eds.), *The wisdom in feelings* (pp. 144-166). New York: Guilford.

Scott-Phillips, T. C., Dickins, T. E., & West, S. A. (2011). Evolutionary theory and the ultimate-proximate distinction in the human behavioral sciences. *Perspectives on Psychological Science, 6*, 38-47.

Scruggs, L., & Benegal, S. (2012). Declining public concern about climate change: Can we blame the great recession? *Global Environmental Change–Human and Policy Dimensions, 22*, 505-515.

Sedikides, C. (1993). Assessment, enhancement, and verification determinants of the self-evaluation process. *Journal of Personality and Social Psychology, 65*, 317-338.

Shah, J., Higgins, T., & Friedman, R. S. (1998). Performance incentives and means: How regulatory focus influences goal attainment. *Journal of Personality and Social Psychology, 74*, 285-293.

Simon, H. A. (1990). A mechanism for social selection and successful altruism. *Science, 250*, 1665-1668.

Skovgaard, J. (2014). EU climate policy after the crisis. *Environmental Politics, 23*, 1-17.

Smith, E. A., & Bird, R. L. (2000). Turtle hunting and tombstone opening: Public generosity as costly signaling. *Evolution and Human Behavior, 21*, 245-261.

Snyderman, M. (1983). Optimal prey selection: The effects of food deprivation. *Behaviour Analysis Letters, 3*, 359-370.

Spence, A., & Pidgeon, N. F. (2010). Framing and communicating climate change: The effects of distance and outcome frame manipulations. *Global Environmental Change, 20*, 656-667.

Spence, A., Poortinga, W., & Pidgeon, N. (2012). The psychological distance of climate change. *Risk Analysis, 32*, 957-972.

Spisak, B. R., Grabo, A. E., Arvey, R. D., & Van Vugt, M. (2014). The age of exploration and exploitation: Younger-looking leaders endorsed for change and older-looking leaders endorsed for stability. *The Leadership Quarterly, 25*, 805-816.

Stancu, V., Haugaard, P., & Lätheenmäki, L. (2016). Determinants of consumer food waste behaviour: Two routes to food waste. *Appetite, 96,* 7-17.

Steg, L. (2005). Car use: Lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A, 39*, 147-162.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 18*, 643-662.

Sundie, J. M., Kenrick, D. T., Griskevicius, V., Tybur, J. M., Vohs, K. D., & Beal, D. J. (2010). Peacocks, Porsches, and Thorstein Veblen: Conspicuous consumption as a sexual signaling system. *Journal of Personality and Social Psychology, 100*, 664-680.

Terwiesch, C., & Xu, Y. (2008). Innovation contests, open innovation, and multiagent problem solving. *Management Science, 54*, 1529-1543.

The World Bank (2016). *GDP growth (annual %)*. Retrieved from http://data.worldbank.org/indicator/ny.gdp.mktp.kd.zg.

Thøgersen, J. (2005). How may consumer policy empower consumers for sustainable lifestyles? *Journal of Consumer Policy, 28*, 143-177.

Tice, D. M., Baumeister, R. F., & Zhang, L. (2004). The role of emotion in self-regulation: Differing roles of positive and negative emotion. In: P. Philippot & R. S. Feldman (Eds.), *The regulation of emotion* (pp. 213-226). Mahwah, NJ: Lawrence Erlbaum.

Todorov, A., Mandisodza, A. N., Goren, A., & Hall, C. C. (2005). Inferences of competence from faces predict election outcomes. *Science, 308*, 1623-1626.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117*, 440-463.

Twenge, J. M., Muraven, M., & Tice, D. M. (2004). *Measuring state self–control: Reliability, validity, and correlations with physical and psychological stress.* Unpublished manuscript, San Diego State University, San Diego, US.

Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science, 224*, 420-421.

Ulrich, R. S. (1993). Biophilia, biophobia, and natural landscapes. In S. Kellert, & E. Wilson (Eds.), *The Biophilia Hypothesis* (pp. 73-137). Washington, DC: Island Press.

Van Dam, Y. K., & Van Trijp, H. C. M. (2011). Cognitive and motivational structure of sustainability. *Journal of Economic Psychology, 32*, 726-741.

Van den Berg, A. E., Koole, S. L., & Van der Wulp, N. Y. (2003). Environmental preference and restoration: (How) are they related? *Journal of Environmental Psychology, 23*, 135-146.

Van den Bos, K. (2001). Uncertainty management: The influence of uncertainty salience on reactions to perceived procedural fairness. *Journal of Personality and Social Psychology, 80*, 931-941.

Van der Wal, A. J., & Boter, J. (2014). [Spatial patterns in sustainable consumer behavior]. Unpublished raw data.

Van der Wal, A. J., Schade, H. M., Krabbendam, L., & Van Vugt, M. (2013). Do natural landscapes reduce temporal discounting in humans? *Proceedings of the Royal Society, Series B, 280*: 1773 20132295.

Van der Wal, A. J., Van Horen, F., & Grinstein, A. (2016). The paradox of 'green to be seen': Green high-status shoppers excessively use (branded) shopping bags. *International Journal of Research in Marketing, 33*, 216-219.

Van der Werf, G. R., Morton, D. C., Defries, R. S., Olivier, J. G. J., Kasibhatla, P. S., Jackson, R. B., ... & Randerson, J. T. (2009). CO_2 emissions from forest loss. *Nature Geoscience, 2*, 737-738.

Van Dijk, E., De Cremer, D., & Handgraaf, M. J. J. (2004). Social value orientations and the strategic use of fairness in ultimatum bargaining. *Journal of Experimental Social Psychology, 40*, 697-707.

Van Dijk, E., Wilke, H., Wilke, M., & Metman, L. (1999). What information do we use in social dilemmas? Environmental uncertainty and the employment of coordination rules. *Journal of Experimental Social Psychology, 35*, 109-135.

Van Horen, F., & Mussweiler, T. (2014). Soft assurance: Coping with uncertainty through haptic sensations. *Journal of Experimental Social Psychology, 54*, 73-80.

Van Lange, P. A. M. (1999). The pursuit of joint outcomes and equality in outcomes: An integrative model of social value orientation. *Journal of Personality and Social Psychology, 77*, 337-349.

Van Lange, P. A. M., Balliet, D. P., Parks, C. D., & Van Vugt, M. (2014). *Social dilemmas: The psychology of human cooperation.* Oxford: Oxford University Press.

Van Lange, P. A. M., Bekkers, R., Chirumbolo, A., & Leone, L. (2012). Are conservatives less likely to be prosocial than liberals? From games to ideology, political preferences and voting. *European Journal of Personality, 26*, 461-473.

Van Lange, P. A. M., Bekkers, R., Schuyt, T. N., & Van Vugt, M. (2007). From games to giving: Social value orientation predicts donations to noble causes. *Basic and Applied Social Psychology, 29*, 375-384.

Van Lange, P. A. M., Otten, W., De Bruin, E., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology, 73*, 733-746.

Van Lange, P. A. M., Schippers, M., & Balliet, D. (2011). Who volunteers in psychology experiments? An empirical review of prosocial motivation in volunteering. *Journal of Personality and Individual Differences, 51*, 279-284.

Van Trijp, H. C. M. (2014). *Encouraging sustainable behavior. Psychology and the environment.* New York: Psychology Press.

Van Vugt, M. (2001). Community identification moderating the impact of financial incentives in a natural social dilemma: Water conservation. *Personality and Social Psychology Bulletin, 27*, 1440-1449.

Van Vugt, M. (2009). Averting the tragedy of the commons: Using social psychological science to protect the environment. *Current Directions in Psychological Science, 18*, 169-173.

Van Vugt, M., Hogan, R., & Kaiser, R. B. (2008). Leadership, followership, and evolution: Some lessons from the past. *American Psychologist, 63*, 182-196.

Van Vugt, M., Meertens, R. M., & Van Lange, P. A. M. (1995). Car versus public transportation? The role of social value orientations in a real-life social dilemma. *Journal of Applied Social Psychology, 25*, 258-278.

Veblen, T. (1899). *The theory of the leisure class*. New York, NY: Macmillan.

Vlek, C., & Keren, G. (1993). Behavioral decision theory and environmental risk management: Assessment and resolution of four 'survival' dilemmas. *Acta Psychologica, 80*, 249-278.

Weinstein, N., Przybylski, A. K., & Ryan, R. M. (2009). Can nature make us more caring? Effects of immersion in nature on intrinsic aspirations and generosity. *Personality and Social Psychology Bulletin, 35*, 1315-1329.

White, K., & Simpson, B. (2013). When do (and don't) normative appeals influence sustainable consumer behaviors? *Journal of Marketing, 77*, 78-95.

Whitmarsh, L., Seyfang, G., & O'Neill, S. (2011). Public engagement with carbon and climate change: To what extent is the public 'carbon capable'? *Global Environmental Change, 21*, 56-65.

Wilson, E. O. (2007). Biophilia and the conservation ethic. In D. J. Penn & I. Mysterud (Eds.), *Evolutionary perspectives on environmental problems* (pp. 249-257). New Brunswick: Transaction Publishers.

Wilson, M., & Daly, M. (1997). Life expectancy, economic inequality, homicide, and reproductive timing in Chicago neighbourhoods. *British Medical Journal, 314*, 1271-1274.

Wilson, M., & Daly, M. (2004). Do pretty women inspire men to discount the future? *Proceedings of the Royal Society, Series B, 271*, 177-179.

WWF (2012). *2012 Living planet report*. Retrieved from http://wwf.panda.org/about_our_earth/all_publications/living_planet_report_timeline/lpr_2012/.

Xanthos, D., & Walker, T. R. (2017). International policies to reduce plastic marine pollution from single-use plastics (plastic bags and microbeads): A review. *Marine Pollution Bulletin, 118*, 17-26.

Yilmaz, G. (2012). Exploring the implementation of minority protection rules in the 'worlds of compliance': The case of Turkey. *Perspectives on European Politics and Society, 13*, 408-424.

Zahavi, A. (1975). Mate selection: Selection for a handicap. *Journal of Theoretical Biology, 53*, 205-214.

Zaval, L., Markowitz, E. M., & Weber, E. U. (2015). How will I be remembered? Conserving the environment for the sake of one's legacy. *Psychological Science, 26*, 231-236.

Summary

The world is burning, literally, due to dry heat waves caused by global warming. But the wildfires are not the only consequence of climate change people are facing today. Pollution, floods, hurricanes, water deprivation, and biodiversity loss are other examples that affect living on earth. Scholars in a broad range of fields acknowledge the fact that humans are the main cause of climate change and that it is of paramount importance to enhance people's sustainable behavior. However, changing people's behavior in the sustainability domain is easier said than done. There is often a big difference between people's intentions to behave sustainably and their actual sustainable behavior, referred to as the sustainability related intention-behavior gap.

The current dissertation tries to explain the intention-behavior gap from the understudied evolutionary perspective. People have evolved innate behavioral tendencies, such as the propensity to prioritize individual interest over collective interest and to value the present over the future, which often hinder them to act sustainably. This happens even when people have positive sustainable attitudes and behavioral intensions, as they are typically unaware of these strong innate drivers. For instance, consciously people might want to act sustainably as they feel guilty about their own non-sustainable actions (e.g., making holiday flights), but are unaware of their innate motivation to desire relative status, holding them back from actually behaving sustainably.

More importantly, the main goal of this dissertation is to provide solutions that can help narrow the sustainable intention-behavior gap. In four empirical chapters it shows the effectiveness of four different strategies in promoting actual sustainable behavior and not merely sustainable attitudes or behavioral intentions (although the dissertation tests both). Each strategy is derived from a distinct premise that evolved through natural selection: (1) humans are self-interested by nature, (2) humans are driven by relative status motives, (3) humans are temporal myopic (i.e., people are oriented towards the here-and-now), and (4) humans are biophilic (i.e., people love and admire nature). It is argued, in the theoretical overview provided in Chapter 1, that the

effectiveness of the strategies is due to the fact that they match these ancestral behavioral tendencies.

Chapter 2 empirically tests the effectiveness of a strategy that matches the self-interested nature of people to enhance sustainable behavior. It proposes that competition can be used as a driving force to promote people's sustainable behavior, as it offers self-interest benefits and ties with humans' innate competitiveness. In Study 2.1 (lab experiment) participants were exposed to a fictitious sustainability competition versus no competition. More specifically, participants had to read and write about joining either a sustainability competition ("students compete to become the most sustainable student of the business school") or a sustainability discussion group ("students participate in discussions about sustainability issues at hand") organized by the university's Green Office. Findings show that joining a competition resulted in more intentional sustainable grocery shopping, monetary donations to WWF, and actual recycling behavior, as compared to no competition.

Furthermore, results demonstrate that the positive effect of competition is more evident among people who are concerned with maximizing their own outcomes (pro-selves) than those who are concerned with maximizing outcomes for the common good (pro-socials). Particularly, Study 2.2 (lab experiment) and Study 2.4 (experimental field study using economic and psychology students as a proxy for pro-selves and pro-socials, respectively) find that competition increases sustainable behavior among pro-selves, whereas pro-socials act sustainably independent of competition. In addition, Study 2.3 (online experiment) demonstrate that pro-selves are motivated by the competitive process itself (e.g., the prospect of winning a contest), whereas pro-socials are motivated by the outcome of the competitive process (e.g., sustainability). Importantly, these results show that a sustainable competition, which matches humans' self-interested nature, even fosters sustainable behavior among pro-selves, who are typically less concerned with serving the common good. By doing so the strategy valuably reaches out to a broader public: both pro-socials *and* pro-selves.

Chapter 3 tests the effectiveness of a strategy that matches humans' innate desire for relative status, but also reveals a paradoxical side-effect. An observational field study looked at the shopping behavior of customers of Marqt (representing a high-

status sustainable grocery chain) and EkoPlaza (representing a lower-status sustainable grocery chain), showing that customers of Marqt buy sustainable groceries for status reasons. Specifically, a comparison among more than 400 customers showed that customers of Marqt bought more new branded shopping bags (21%) compared to customers of EkoPlaza (2%), enabling them to publicly display their sustainable behavior. These results indicate that high status-oriented customers (customers of Marqt) buy ten times more branded shopping bags, which is in itself a non-sustainable and wasteful act. In other words, people who act sustainably for status motives, show-off their sustainable behavior to others at the expense of the environment. It is therefore important to take these negative consequences into account when matching policy or marketing strategies to people's innate status motives for the promotion of sustainable behavior.

Chapter 4 empirically tests the successfulness of a strategy that matches humans' temporal myopic nature – people value the present over the future – to increase people's sustainable behavior. More specifically, it demonstrates the importance of emphasizing the immediate benefits of sustainable behavior during uncertain times. In Study 4.1 (lab experiment) participants read a paragraph about the world being either depicted as certain (e.g., "almost everything in the world is stable" and "the future is affected by expectable world events") or uncertain (e.g., "nothing in the world is stable" and "the future is affected by coincidental world events") and wrote about a corresponding situation that happened in their lives. Results show that uncertainty decreases people's sustainable behavior. Study 4.2 (online experiment) replicates the finding and provides evidence for the underlying mechanism of temporal discounting (the preference for smaller immediate rewards over bigger future ones). In particular, people become more immediate oriented and display higher levels of temporal discounting during uncertainty. Since sustainable behavior is inherently associated with a future orientation, this increased level of temporal discounting hinders people from acting sustainably.

Even though uncertainty decreases sustainable behavior, it does not mean that the promotion of sustainable behavior during uncertain times is destined to fail. As an example, Study 4.3 (lab experiment using the economic crisis as uncertain event) and

Study 4.4 (experimental field study using the terror attack at Brussels' international airport and subway system on March 22, 2016 as uncertain event) tested a strategy that could reverse the negative effect of uncertainty on sustainable behavior. In particular, the studies find that highlighting immediate benefits of sustainable behavior yields a more positive valuation of sustainable products and higher sustainable monetary donations, respectively. This is of significant importance, as people currently face many highly uncertain events, such as terror attacks, volatile economies, intensive migration, and the unpredictable impact of climate change itself.

In Chapter 4 it was shown that temporal discounting is an important predictor of non-sustainable behavior. Following up on this finding, Chapter 5 tests whether people's biophilic nature – people innately love and admire nature – could decrease this discounting of the future. In Study 5.1 (lab experiment) participants were exposed to either city or nature pictures and were thereafter asked to indicate their preference for 100 euros now (i.e., immediate reward) or a bigger amount in 90 days (i.e., delayed reward; ranging from 110 to 170 euros with 10 euros increments). A choice for a lower delayed reward indicates lower temporal discounting. On average participants exposed to nature pictures already chose for the future amount from 125 euros, whereas participants exposed to city pictures chose for the future amount from 138 euros.

Importantly, Study 5.2 (lab experiment) measures temporal discounting after exposure to nature or city pictures or directly (without exposure), and demonstrate that nature exposure lowers temporal discounting levels. Furthermore, it measures people's valuation of the bigger monetary amount in 90 days, and find that people's choice for a lower delayed reward after being exposed to nature, could be explained by an enhanced valuation of the future. Study 5.3 (experimental field study) replicate the latter finding in a natural setting in which participants were exposed to either the Amsterdam Zuidas or the Amsterdam forest. Overall, these findings indicate that nature exposure reduces people's temporal discounting and, combined with Chapter 4 showing that temporal discounting decreases sustainable behavior, suggest that a strategy matching people's biophilic nature might be successful in the promotion of sustainable behavior as well.

Overall, this dissertation was set out to find ways to enhance people's sustainable behavior and show that an evolutionary perspective could be a valuable approach to help narrow the sustainable intention-behavior gap. Chapter 6 ends with important recommendations for both practitioners as well as scientists. In accordance with the four premises studied in Chapters 2-5, it provides practical and relatively easy implementable implications for marketers, public policy makers, and NGOs: (1) create sustainability competitions, (2) make sustainability a status symbol (while being cautious about the paradoxical side-effect), (3) highlight the immediate benefits of sustainability, and (4) expose people to nature scenery. Furthermore, the dissertation provides in-depth future research directions – based on an evolutionary perspective – that might establish more successful strategies to foster sustainable behavior. Hopefully, altogether this dissertation is a valuable step in the quest of growing a more sustainable world.

ABRI dissertation series

1. Drees, J. M. (2013). The polycentricity of expansion strategies: Beyond performance as a main driver.
2. Arzlanian, S. (2014). Social networks and firm performance: Examining the relation between dimensions of social capital, social network perception and firm performance.
3. Fleisher, C. (2014). The contemporary career navigator: Individual and organizational outcomes of self-directed career management.
4. Wruck, S. (2014). Warehouse operations revisited: Novel challenges and methods.
5. Volk-Makarewicz, W. (2014). Advances in derivative estimation: Ranked data, quantiles, and options.
6. Van Anholt, R. (2014). Optimizing logistics processes in cash supply chains.
7. Polat, T. (2015). Active aging in work: Motivating employees to continue working after retirement.
8. Ossenkop, C. (2015). What you see is what you get!? Looking into ethnic diversity and professional careers in Dutch organizations.
9. Engel, Y. (2015). Venturing into the unknown, but not for the first time: An examination of firm-founders' careers & entrepreneurial decision-making under uncertainty.
10. Kolbe, L. (2015). The mindset of the R&D professional: Decision making in innovative context.
11. Pachidi, S. (2015). Crunching the numbers: Studying the enactment of analytics in an organization.
12. El Baroudi, S. (2015). Shading a fresh light on proactivity research: Examining when and how proactive behaviors benefit individuals and their employing organizations.
13. Eijdenberg, E. L. (2016). Small business growth in east African least developed countries: Unravelling the role of the small business owners.
14. Lysova, E. I. (2016). What does your career mean to you? Understanding individual career and work behaviors through the prism of the meaning of career.
15. De Mol, E. (2016). Heart and brain: The influence of affective and rational determinants in new venture teams: An empirical examination.
16. Daubner-Siva, D. (2016). Dealing with dualities: A paradox perspective on the relationship between talent management and diversity management.
17. Berkhout, J. (2016). Topics in Markov chain theory and simulation optimization.

18. Van Werven, R. (2017). Acquiring resources for a new venture: A study of the micro-level linguistic practices of startup entrepreneurs.
19. Prats Lopez, M. (2017). Managing citizen science in the Humanities: The challenge of ensuring quality.
20. Kaandorp, M. S. (2017). Creating from within: A study on interpersonal networking approaches and intuition in task-related interaction.
21. Van Grinsven, M. (2017). A patient is not a car; lean in healthcare: Studying agency in the translation of management concepts.
22. Muleta Eyana, S. (2017). Entrepreneurial behavior and firm performance of Ethiopian tour operators.
23. Van Ee, M. (2017). Routing under uncertainty: Approximation and complexity.
24. Van Dijk, M. (2017). When I give, I give myself: Essays on individual contributions to societal goals.
25. Oostervink, N. (2017). Self-organizing knowledge: Examining the conditions under which professionals share and integrate knowledge.
26. Mousavi, S. (2017). Managing innovation for sustainability: A dynamic capabilities approach.
27. Cai, W. (2017). Awakening employee creativity in organizations.
28. Kranzbühler, A. M. (2018). Orchestrating the customer journey: Four essays on how to create meaningful customer experiences.
29. Chabala, M. (2018). Small firm growth in a least developed country: How small firm owners affect the growth of their firms in Zambia.
30. Choongo, P. (2018). Sustainable entrepreneurship in Zambia: The engagement in and effect of sustainable practices in small and medium-sized enterprises.
31. Hilbolling, S. (2018). Organizing ecosystems for digital innovation.
32. Van der Wal, A. J. (2018). Harnessing ancestral roots to grow a sustainable world.